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The Irish Naturalist

VOLUME XI.

ADDITIONS TO "IRISH TOPOGRAPHICAL BOTANY"

IN 1901.

BY R. LLOYD PRAEGER, B.A.

(Read before the Dublin Naturalists' Field Club, 19th November, 1901.)

A SUMMARY of each year's additions to the county records of "Irish Topographical Botany" will, no doubt, be of use and interest to field-botanists, and I present herewith the first of what I trust will be a long series of summaries of the kind. "Irish Topographical Botany" was printed off early last June, but owing to delays in the delivery of the maps, the book was not issued till early August. In consequence the season was practically lost; otherwise I do not doubt that the lists of blanks filled up in the county floras would have been much larger. I trust that, with the help of the lists of commoner desiderata which I published in the September and October numbers of this Journal, many of these blanks will be wiped out this year.

A review of the past season's results shows that, though little systematic field-work was carried out—or at least published—the year has been by no means unfruitful. A number of interesting discoveries stand out pleasantly, the more so because the announcements have in some cases come from unexpected quarters. The best find of the year is undoubtedly the sub-arctic sedge *Carex irrigua*, an addition to the Irish flora, gathered in Antrim by Miss Elinor D'Arcy, aged eleven, and shown by Mr. Colgan to be locally abundant round the head of Glenariff. Another Antrim find, of a much rarer species, is that of *Spiranthes Romanzoffiana*, our famous North American orchid, already known from Cork, Armagh, and Derry. Mr. William West found this near Lough Neagh, when engaged

in exploring the alga-flora of that lake for the Royal Irish Academy. The discovery of the pretty *Pyrola secunda* by Mr. Tetley in Fermanagh is most welcome, especially in view of the unsuccess of repeated attempts to confirm the only previous stations in Antrim and Derry. In the west, Mr. Grierson has done good service in showing that another of our rarest British plants, the Mediterranean orchid, *Habenaria intacta*, is not confined to the limestone pavements, as appeared to be the case; and Mr. W. A. Barnes has strengthened the claim of *Sisyrinchium angustifolium* to be considered native by finding it in wild ground on Lough Erne, a great extension of range. Mr. Coote's report of the abundance of the Yellow Bird's-nest, *Hypopithys*, that strange parasite, in his demesne in Roscommon, is also welcome, in view of the extreme sparsity of the plant in this country. Among critical plants, most valuable work has been done by Rev. W. Moyle Rogers on the Brambles, during a fortnight spent in the north-east. As a result, two new forms, *R. cinerosus* and *R. Lettii*, are described, and much clearing up of doubtful plants accomplished. One species, *R. mutabilis*, is added to the Irish list, from both north-east and south-west, but against this two north-eastern plants, *R. gratus* and *R. pubescens*, must, for the present at least, be withdrawn.

I now give a list of the new county records, arranged under county-divisions, and shall then arrange these records under species in the style of "Irish Topographical Botany."

2. KERRY N.—

Rubus plicatus.	R. mutabilis.
R. pulcherrimus.	

6. WATERFORD.—*Primula veris*.

9. CLARE,—

Malva moschata.	Prunus Cerasus.
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12. WEXFORD.—

Atriplex farinosa.	Lemna polyrrhiza.
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13. CARLOW.—*Habenaria bifolia*.

18. KING'S COUNTY.—*Ononis repens*.

19. KILDARE.—*Botrychium Lunaria*.

21. DUBLIN.—*Carex aquatilis*.

22. MEATH.—
 † *Geranium columbinum.* *Veronica agrestis.*
25. ROSCOMMON.—
Ranunculus Auricomus. *Empetrum nigrum.*
Sisymbrium Alliaria. *Populus tremula.*
Rhamnus Frangula. *Agrostis alba.*
Hypopithys multiflora. *Melica uniflora.*
30. CAVAN.—
Prunus Padus. *Ceanothe fistulosa.*
32. MONAGHAN.—*Primula veris.*
33. FERMANAGH.—
Pyrola secunda. *Carex teretiuscula.*
Sisyrinchium angustifolium. *Botrychium Lunaria.*
36. TYRONE.—
Vicia hirsuta. *Carex Hornschuchiana.*
Lemna trisulca.
37. ARMAGH.—
Rubus micans. *R. oigocladus (var. Newbouldii).*
R. Lettii. *R. Bloxamii.*
R. Gelertii. *Habenaria viridis.*
R. dunensis.
38. DOWN.—
Rubus argentatus. *R. anglosaxonicus (var. vestitifomis).*
R. myricæ (var. hesperius). *R. Borreri.*
R. micans. *R. dunensis.*
R. cinerosus. *R. mutabilis.*
39. ANTRIM.—
Rubus plicatus. *Spiranthes Romanzoffiana.*
R. micans. *Carex irrigua.*
R. Gelertii.

The following notes give particulars of the more interesting finds of the year, whether new county-records, confirmations of old records, or additional stations where one or two only were previously known. A few stray older records are also included. Unpublished matter is given in greater detail than published matter, for natural reasons. New county-records are distinguished by the county-division being printed in SMALL CAPITALS. The formula and contractions employed are those

of "Irish Topographical Botany." The note of admiration signifies, as usual, that I have seen a specimen :—

Ranunculus scleratus, L.

25. Roscmn.—Cloontimullan '98, T. A. Mapother—*Hb. S. & A.M.* !

R. Lingua, L.

20. Wicklow.—Murrrough '72, *Hb. Steele*—*Hb. S. & A. M.* !

R. Aurlcomus, L.

25. ROSCMN.—Cloontimullan '98, T. A. Mapother—*Hb. S. & A. M.* !

Papaver Rhæas, L.

12. Wexford.—In *I.T.B.*, p. 15, add "Rare."—See *I.N.*, x., 152, 170.

Sisymbrium Sophia, L.

6. Waterfd.—Dunmore, Miss Taylor, *Hb. Miss Ball*—*Hb. S. & A. M.* !

S. Alliarla, Scop.

25. ROSCMN.—Kilteevan '98, T. A. Mapother—*Hb. S. & A. M.* !

Erysimum cheiranthoides, L.

25. Roscmn.—Kilteevan '97, T. A. Mapother—*Hb. S. & A. M.* !

Viola odorata, L.

25. Roscmn.—Kilteevan '97, T. A. Mapother—*Hb. S. & A. M.* !

Lychnis diurna, L.

12. Wexford.—In *I.T.B.*, p. 55, add "Rare." See *I.N.*, x., 152, 170.

29. Leitrim.—Glenade '80, F. W. Moore, *Hb. Steele*—*Hb. S. & A. M.* !

Montia fontana, L.

9. CLARE.—Inagh '00: pretty common—P. H. Grierson !

Malva moschata, L.

9. CLARE.—Tulla '01—R. D. O'Brien. Ballyvaughan '84, H. G. Carroll—*Hb. S. & A. M.* !

Radiola linoides, Roth.

31. Louth.—Carlingford hills frequent '01—N. Colgan.

†**Geranium columbinum**, L.

22. MEATH.—In plenty at Moynalty, on edges of cultivated fields in light soil, '01—W. A. Barnes !

Rhamnus catharticus, L.

25. Roscmn.—St. John's '98, T. A. Mapother—*Hb. S. & A. M.* !

R. Frangula, L.

25. ROSCMN.—Kilteevan '98, T. A. Mapother—*Hb. S. & A. M.* !

Ononis repens, L.

18. KING'S CO.—Near Shinrone '01—Miss Annette Hemphill !

Vicia hirsuta, Koch.

36. TYRONE.—Dungannon '96—Mrs. Leebody.

Prunus Padus, L.

30. CAVAN.—Castle Hamilton '01—W. F. de V. Kane.

P. Cerasus, L.

9. CLARE.—South of Cloonlara, '01—R. D. O'Brien !

Rubus.—The whole of the additional information of the year relating to the Brambles will be found in the November number of the *I.N.*, and need not be repeated here. This consists of Mr. Rogers' valuable paper on north-eastern forms, and a note by Mr. Druce on some *Rubi* observed in Kerry and Wicklow. The new county-records

which these yield are summarized above; for many additional stations for others, the papers quoted should be consulted. On the opposite side of the account, the records given in *I.T.B.* for *R. gratus* and *R. pubescens* must be withdrawn or held over, also the Down record for *R. silvaticus*, while the Westmeath *R. danicus* is to be transferred to *R. mollissimus*.

Potentilla procumbens, Sibth.

12. Wexford.—Rosslare, common 'or—C. P. Hurst, *I.N.*, x., 255.

Agrimonia odorata, Mill.

27. Mayo W.—Rosserk Abbey 'oo—R. Ll. P.

Pyrus Aria, L.

20. Wicklow.—Glen of the Downs, native, 'or—R. Ll. P.

Parnassia palustris, L.

13. Carlow.—Common about Borris 'or—T. Hartley.

Oenanthe fistulosa, L.

30. CAVAN.—Belturbet 'or—W. West.

Anthemis nobilis, L.

39. ANTRIM.—Trostan 'or—C. F. D'Arcy, *I.N.*, x., 194.

Hieracium vulgatum, Fr.

40. L'derry.—Benevenagh 'oo, Lett—W.B.E.C., 1900-1.

Pyrola secunda, L.

33. FERMAN.—Carrol Glen, 'or—W. N. Tetley! and *I.N.*, x., 171

Hypophyllum multiflorum, Scop.

25. ROSCMN.—Carrowroe Park "fairly common" 'or—S. V. Coote!
and *I.N.*, x., 201.

Primula officinalis, Jacq.

6. WATERFORD.—Curraghmore and Lahardane 'or, quite ree from suspicion—W. W. Flemyng.
†32. MONAGHAN.—"Certainly is occasional in a pasture near Ballanode, and also near Cornacassa. Formerly here Drum-reaske], but has died out—W. F. de V. Kane.

Cuscuta Trifolii, Bab.

12. Wexford.—Lady's Island Lake 'or—C. P. Hurst, *I.N.*, x., 255
20. Wicklow.—Still at Fassaroe 'or—R. M. Barrington!

Lycium barbarum, L.

12. Wexford.—Rosslare 'or—C. P. Hurst, *I.N.*, x., 255.

Scrophularia aquatica, L.

37. Armagh.—Near Newry 'or—H. W. Lett.

Veronica agrestis, L.

22. MEATH.—Moynalty 'or—W. A. Barnes!

Pinguicula lusitanica, L.

12. Wexford.—In *I.T.B.*, p. 247, for N.E. read N.W.

Atriplex farinosa, Dum.

12. WEXFORD.—Rosslare, plentiful, 'or—C. P. Hurst, *I.N.*, x., 255

Polygonum Bistorta, L.

36. Tyrone.—Irvinestown 'or—W. N. Tetley.

P. maculatum, Trimen and Dyer.

12. Wexford.—Lady's Island Lake "in fair plenty" 'or—C. P. Hurst,
I.N., x., 255.

Saxifraga herbacea, L.

39. ANTRIM.—Slievenanee '01—C. F. D'Arcy, *I.N.*, x., 194.

Populus tremula, L.

25. ROSCMN.—About Kiltewan, "I believe wild," '01—T. A. Mapother.

Empetrum nigrum, L.

25. ROSCMN.—Dugara and Clooniff '97—T. A. Mapother!

Taxus baccata, L.

39. ANTRIM.—Glenariff, two bushes, '01—C. F. D'Arcy, *I.N.*, x., 193.

Juniperus nana, Willd.

39. ANTRIM.—Glenariff '01—C. F. D'Arcy, *I.N.*, x., 192.

Epipactis latifolia, All.

30. CAVAN.—Castle Hamilton '01—W. F. de V. Kane.

Spiranthes Romanzoffiana, Cham.

39. ANTRIM.—Between Antrim and Toome '01—W. West; and *I.N.*, x., 171, *Journ. Bot.*, xxix., 343.

Ophrys apifera, Huds.

28. SLIGO.—Near Knocknarea Glen '01—Miss E. McIntosh!
33. FERMAN.—Drumcose near Ely Lodge '01—West and Tetley.

Habenaria intacta, Benth.

9. CLARE.—Two stations near Ennistymon, 6 or 8 miles from nearest limestone, '01—P. H. Grierson! and *I.N.*, x., 143.

H. viridis, R. Br.

37. ARMAGH.—Near Newry '01—H. W. Lett.

H. bifolia, R. Br.

13. CARLOW.—Near Ballymurphy '01—T. Hartley!

Sisyrinchium angustifolium, Mill.

33. FERMAN.—In quantity in wild ground at Derryvore on Upper Lough Erne '98—W. A. Barnes!

Lemna trisulca, L.

36. TYRONE.—Dungannon and L. Neagh '96—Mrs. Leebody.

L. polyrrhiza, L.

12. WEXFORD.—Three stations near Rosslare '01—C. P. Hurst, *I.N.*, x., 255.

L. gibba, L.

12. Wexford.—Lady's Island Lake and Broadway '01—C. P. Hurst, *I.N.*, x., 255.

Carex irrigua, Hoppe.

39. ANTRIM.—In three stations near Parkmore '01, Colgan and D'Arcy—Colgan, *I.N.*, x., 165-7.

C. teretiuscula, Good.

33. FERMAN.—Devenish '01—West and Tetley!

C. curta, Good.

- Ferman.—By Tempo road '01—West and Tetley!

C. aquatilis, Wahlb.

21. DUBLIN.—Glenasmole '00—N. Colgan, *I.N.*, x., 49.

C. Hornschuchiana, Hoppe.

36. TYRONE.—Dungannon '96—Mrs. Leebody!

Glyceria Borreri, Bab.

12. Wexford.—S.W. corner of Wexford Harbour '01—C. P. Hurst, *I.N.*, x., 255.

Bromus racemosus, L.

38. Down.—Rathfriland '00, Waddell—W.B.E.C. 1900-I.

Lastrea Thelypteris, Presl.

23. Westmeath.—S.E. end of L. Owel '01—C. F. D'Arcy, *I.N.*, x., 201.

Botrychium Lunaria, Sw.

19. KILDARE.—Prosperous '60—T. Cooke Trench.
33. FERMAN.—Knockmore '01—W. West.

As regards non-native plants, the usual variety of exotics of various degrees of standing is reported. Also one or two strange occurrences which the botanist may amuse himself trying to explain—for instance, *Cotoneaster microphylla*, from the Himalayas, growing over a rock by a tarn in among the Nephin Beg range in Mayo, far from any house, road, or sign of former cultivation; or *Cyclamen* sp., found in Newtown Glen, near Lough Gill, Co. Sligo!

The last botanical contribution of the year is Mr. Colgan's paper in the December number of this Journal. I have read with much interest his remarks on floral diversity, my mind having been working in the same groove on account of comparisons brought forth by the Table of Distribution of "Irish Topographical Botany." While Mr. Colgan's "index of floral diversity" expresses the dissimilarity between two floras in simpler terms than had occurred to me, I doubt whether for most purposes of comparison the process has not been carried rather far. If we wish merely to compare the *amount* of diversity of flora between two areas, his "index" is sufficient: it means—*of the total flora of the two areas, so-and-so per cent. occurs in one or other, not in both.* But this statement is sure to raise the questions—how many of this so-and-so per cent. are confined to area A, how many to area B, and what is the relation of each to the total flora of each, and to the number of plants common to both? All these facts were expressed in the original fraction, but have been eliminated by (1) adding together the two constituents of the numerator, and (2) substituting a decimal for the actual denominator. An example from Mr. Colgan's paper will make my meaning clear. Antrim and South Kerry (total floras 777 and 680 species respectively) have 602 species in common, 175 peculiar to Antrim, 78 peculiar to South

Kerry, and a total combined flora of 855. Mr. Colgan's "index" is therefore $\frac{253}{855}$, or '296. But if, instead of '296 we express the relation as $\frac{175+78}{855}$, or for sake of clearness $\frac{A\ 175+B\ 78}{855}$, A standing for Antrim and B for South Kerry, all the facts of the case stand out clearly; whereas '296 *might* mean that there were 253 plants peculiar to Antrim, and *none* peculiar to Kerry. I fancy, however, that in practice two formulæ will be used by the botanist who takes up this branch of plant-distribution, namely, Mr. Colgan's "index" for expressing the floral diversity of two areas apart from the constituent factors; while the simple formula $a+b+c$, where a expresses the number of species common to both, and b and c the number peculiar to each, will give all the further information required. Thus, in the case above quoted, the formula Antrim+South Kerry = $602+175+78$ gives a full numerical comparison of the floras. Mr. Colgan's "index," expressed in these terms, is, of course, $\frac{b+c}{a+b+c}$.

IS THE HOLLY DIOECIOUS?

BY THOMAS COOKE-TRENCH.

IN *The Irish Naturalist* for May, 1901, I raised the above question, and it may be of interest to the readers of the Journal to learn the result of my experiments on the subject.

It will be remembered that Darwin, while stating that of many plants examined, he had never found one that was really hermaphrodite, admits that of the several authorities that he had consulted one only states that the Holly is dioecious.

The experience of a correspondent of my own, living in the New Forest, agrees with Darwin's. My friend marked a number of berry-bearing Hollies in the Forest, and subsequently brought home and carefully examined the flowers of these, but in no case was pollen found in the anthers.

An anonymous friend has sent me the following extract from Willis' "Flowering Plants and Ferns," Vol. II. :—" *Ilex Aquifolium*. Flowers dioecious, but in the female flower the

sterile stamens are so large that the flower appears hermaphrodite. Truly hermaphrodite flowers sometimes occur." This appears on the whole to be the most probable solution. The following is the result of my own experiments :—

While the trees were in blossom I enclosed about fifty blossom-bearing twigs in gauze bags. The majority of these I opened in August, when berries generally were full grown, but not yet coloured. To my surprise I found them all to contain berries to all appearance just like those outside. To make sure, however, that these were fertile berries, I left the bags on nine, and did not open these till November 9th. The result was as follows—Nos. 1, 2, 3, 4, 5, and 6. The berries had become completely aborted, turned black and shrivelled up. No. 7 had become loose at the tying, so that flies or other small insects could enter, and here there was a crop of well-ripened berries scattered all along, but sparsely, there being seldom more than one berry in an axil, and in only one case were there three. No. 8 had a single berry ripened, all the rest being aborted and shrivelled up. In the case of No. 9 I had noticed through the gauze that there were berries inside, and therefore examined the bag very carefully before removing it. I may safely say that it was as secure as any of the bags which had effectually excluded fertilization. There were within it four matured berries. They were all near one another, and the bag kept well off them by the leaves.

Nos. 1 to 7 clearly point to the Holly being diœcious. I think the single berry on No. 8 may be disregarded as the result of an accident. It lay very near to, if not touching, the bag, and may possibly have become fertilized through it, or it may have been an abnormally early blossom that got fertilized before the bag went on. No. 9 with its four berries, three of them close together, and the fourth about two and a half inches from them, is more of a puzzle. Did some insect get in through a hole that escaped my inspection, or did we chance upon one of those hermaphrodite flowers that Willis mentions as sometimes occurring?

I hope to repeat the experiment next year, and communicate the result to *The Irish Naturalist*. Will some of the readers of this Journal join in the experiment?

NOTES ON SOME MOSSES IN NORTHERN IRELAND.

BY J. H. DAVIES.

WITH the exception of a few gathered in the district of the Mourne Mountains, and in County Armagh, the mosses enumerated in the short list here given, have recently been met with in the course of pleasant rambles in the neighbourhood of Lisburn.

Through the long-continued absence of rain during a great part of last summer, some of the deep bogs became so dried up that opportunity was afforded for more patient examination of their bryological productions than could conveniently be given under usual conditions. Thus, species inhabiting such places were detected which else might have remained unnoticed. Of such are *Mnium subglobosum*, *Hypnum vernicosum*, and *H. giganteum*, not to mention others.

For some of the rarer mosses of the north-east of Ireland additional localities are supplied, and as will be seen, the list contains the names of some which do not appear in Stewart and Corry's *Flora*, nor in the Supplement to that work; also of some which seem to be new to the Irish Moss-flora.

Especially gratifying and interesting was it to gather so far north the beautiful *Webera Tozeri*, hitherto known only as a southern species, whose head-quarters are in the regions of the Mediterranean.

As in some previous bryological notes contributed to these pages, it has been found convenient to follow the nomenclature adopted by Mr. H. N. Dixon in the "Student's Handbook of British Mosses." Mr. Dixon, from whom I have received much kindness and serviceable information, has verified or named for me all doubtful species that from time to time have been submitted to him.

Pleuridium alternifolium, Rabenh.—Very abundant on sandy ground in a field off Longstone Lane, Lisburn, Co. Antrim. Though stated to be not infrequent in England, we seem to have but one other station in Ireland, Warrenpoint, Co. Down (*Waddell*); *Fl. N.E.I.* In his *Synopsis*,¹ under *P. alternifolium*, B. and S., Dr. Moore gives two southern stations, one in County Cork, and the other in County Kerry, quoted from *Flora Hibernica*. But the plant given in *Fl. Hib.* is *Phascum alternifolium*, Dicks., which, I

¹ *Proc. R.I.A.*, 1872, p. 344.

believe I am right in stating, is not *Pleuridium alternifolium*, B. and S. but *Archidium alternifolium* (Dicks.), Schp. = *A. phascoides*, Brid., and that this was the plant intended by Dr. Taylor, seems to be sufficiently indicated by his short description. The only two stations cited in the *Synopsis* should, therefore, I think, be transferred to *A. alternifolium*, Schp., which species is not noted by Moore. The shifting and tossing about, from time to time, of many species of mosses, from one genus to another, by various authors, have encumbered them with a mass of synonyms, sometimes more or less confusing.

Dicranella secunda, Lindb.—Peaty soil on the top of Colin Mountain, Co. Antrim.

D. rufescens, Schp.—On crumbling red sandstone at Derriaghy, Co. Antrim.

D. Schreberi, Schp.—Clayey ground at Munro's Dam by the Moira road, and in a gravel pit at Causeway End near Lisburn, Co. Antrim.

Var. **β elata**, Schp.—At the foot of an oozy bank by the River Lagan, half a mile below Lisburn, Co. Down; also at the side of a drain in a boggy field at Fairy Well, Lisburn, Co. Antrim.

For the type there seems to be no previous record from the North. Moore knew of it only in Co. Dublin (1869), and says "Not hitherto observed elsewhere in Ireland." Dr. Braithwaite, however, in *British Moss Flora*, gives two prior Irish records Mangerton (*Miss Hutchins*) and S. of Ireland (*Mackay*), from specimens, as he informs me, in the Hookerian herbarium at Kew.

For the variety, a well-marked and much larger plant, I know of only one other Irish station.

Dicranowelsia cirrata, Lindb.—Is widespread around Lisburn, in both counties, on trees and the thatched roofs of cottages. On thatch it is very luxuriant and fruits freely.

Campylopus flexuosus, Brid., var. **β uliginosus**, Ren. (= var. *paludosus*, Schp.)—In boggy places on Colin and Aughrim. I know of only one other Irish record, but the plant is likely not infrequent.

C. atrovirens, De Not.—With the last in both localities, where it is plentiful.

C. brevipilus, B. and S.—Dry bare places on the top of Colin Mountain, Co. Antrim, in great quantity. The loose soil on which it grows is so dry and shallow that much of the moss becomes detached, and is found blown about in scattered heaps. In the North, previously known only in the Mourne Mountains, and Moore was aware of only two other Irish stations.

Fissidens pusillus, Wils.—On fallen blocks of Greensand in the upper part of Colin Glen, Co. Antrim. Apparently a very rare plant in Ireland, known only in two other places, both in Co. Antrim, where it was found by Mr. S. A. Stewart.

F. osmundoides, Hedw.—On dripping rocks at the head of Colin Glen, Co. Antrim.

- Grimmia trichophylla**, Grev.—Frequent amongst the hills near Lisburn, Co. Antrim, and fruiting in some of its localities. Mr. Stewart (in *Fl. N.E.I.*) records it only from Co. Down, and it seems to be rather rare in Ireland.
- G. Hartmani**, Schp.—On stones in a shady lane on the southern slope of Whitemountain, Co. Antrim. The characteristic clusters of curious gemmæ on the leaves are very numerous in all the specimens that were gathered. There seem to be but two other stations for this plant, Galway (*Moorc*, 1872), and Fairhead (*Dixon*, 1891).
- Tortula papillosa**, Wils.—On trees in the avenue of Edenderry House, Co. Down.
- Barbula cylindrica**, Schp.—Fruiting in quantity on a wall at Lisnagarvey, Lisburn, Co. Antrim, and on rocks by River Lagan above Lisburn, Co. Down. Not infrequent in a barren state, but very rarely fertile.
- B. vinealis**, Brid.—Amongst *Zygodon viridissimus* on an Ash tree at Drumbridge, Co. Antrim. Mr. Stewart knew of satisfactory specimens from only one place in the North, but is probably right in his supposition that it occurs elsewhere.
- Weisia tenuis**, C. M.—Sparingly on the red sandstone at Derriaghy, Co. Antrim. This very pretty little moss seems rare in Ireland.
- W. verticillata**, Brid.—On dripping limestone by the Ulster Canal, Benburb, Co. Armagh.
- Trichostomum mutabile**, Bruch, var. **littorale**, Dixon. (*Mollia littoralis*, Braithw.)—In crevices of rocks in the stream above Colin Glen, Co. Antrim.
- T. tenuirostre**, Lindb.—Damp stones, River Lagan, Lisburn, Co. Antrim. Noted as rare in the North, but probably sometimes passed over on account of its likeness to other mosses.
- Orthotrichum rupestre**, Schleich.—On granite, Glasdrumman, Co. Down.
- O. affine**, Schrad, var. **β rivale**, Wils.—At roots of Alder, liable to be submerged, by the side of River Lagan, above Lisburn, Co. Antrim. This variety does not seem to have been distinguished in Ireland before.
- O. tenellum**, Bruch.—On a large Ash tree on the left bank of the Bann, a little below Moyallon, and on Ash by the Saintfield road near Lisburn, Co. Down. In the North there was only one station—also in Co. Down—and the species seems to be rare elsewhere in Ireland.
- Splachnum ampullaceum**, Linn.—Whitemountain, Co. Antrim.
- Ephemerum serratum**, Hampe, var. **β angustifolium**, B. and S.—Bank on the left-hand side of Longstone Lane, Lisburn, Co. Antrim, April, 1901. The variety is even more minute than the type, and differs so much from that that Dr. Braithwaite, in *British Moss Flora*, accords it specific rank as *E. minutissimum*, Lindb. So very inconspicuous is it—one of the smallest of our British mosses—that, were it not for the green, confervoid protonema which catches

attention, it would in all likelihood escape observation. The plant so far as I know, is new to the Irish list, and is rare in England, having been noticed there only in two localities, Hurstpierpoint (Mitten), and Sevenoaks (Holmes).

Bartramia ithyphylla, Brid.—Sandy bank, Avonmore, Lisburn, Co. Antrim. A characteristically montane species, of by no means frequent occurrence, growing here in a distinctly lowland locality.

Philonotis calcarea, Schp.—Dripping rocks by the Ulster Canal, Benburb, Co. Armagh.

Webera annotina, Schwgr., for which a locality was given in former notes, proves to be pretty widely diffused about Lisburn. Along the sandy banks of the Derriaghy streamlet it has been traced for a distance of nearly a mile, and I have also gathered it in various places on the Co. Down side of the River Lagan.

Webera Tozeri, Schp. (*Epipterygium Tozeri*, Lindb., of Braithwaite's *Br. M. Fl.*)—On soft sandstone by the side of a streamlet, where it crosses the road below Derriaghy-Miltown, Co. Antrim. Of examples of this which I forwarded to Mr. Dixon he writes:—"Your moss is undoubtedly *Webera Tozeri*, and is very interesting, as it must, I think, extend its range very considerably northward. I do not, at any rate, know of its existence except in the most southern counties of England and Ireland: and, I think, on the Continent it is not known so far north. It is curious that it is on just the same soft, red, sandy rock that it affects in the south of England." According to Dr. Moore its only other Irish station is at the side of the River Lee at Cork (1840). By the discovery of the plant in Co. Antrim its limit is, therefore, extended from lat. $52\frac{1}{2}^{\circ}$ to lat. $54\frac{1}{2}^{\circ}$. In the present locality it does not grow on any part of the rock that is fully exposed to the light, being confined to a small area, shaded by the drooping stems of *Melica uniflora* from an overhanging bank. The red sandstone at this place is bryologically most interesting, producing as it does, in addition to the species under notice, several of our rarer mosses: *Dicranella crispa*, *D. rufescens*, *Fissidens viridulus*, *Tortula marginata* (the only Irish station), *Barbula tophacea* var. *acutifolia*, *Weisia tenuis*, *Webera annotina*, and *Hypnum polygamum*, which are to be seen growing within a few paces one from another.

Bryum fillforme, Dicks.—On rocks in the stream flowing past the Wooden House, near Annalong, Co. Down.

B. rubens, Mitt.—Sandy soil in bare places amongst grass in the third field on the right-hand side of Longstone Lane, Lisburn, Co. Antrim, with immature fruit, 12th April, 1901. A scarce *Bryum*, allied to *B. erythrocarpum*, for which there is no prior Irish record, and which in England has been found only in Sussex and Northamptonshire. In the field, when in fruit, its loose straggling habit is a character by which it may be recognised.

Mnium affine, Blandow (*M. cuspidatum*, Neck.). Damp ground amongst grass in a gravel pit near Fairy Well, Lisburn, Co. Antrim. Another species, which although common in England is, according to published records, rare in Ireland, and it is one not very likely to be overlooked.

- Mnium subglobosum**, B. and S.—In a deep wet bog on Whitemountain, Co. Antrim.
- Heterocladium heteropterum**, B. and S., var. β **fallax**, Milde.—On stones in several places in Colin Glen, Co. Antrim. I do not know that this has been recognised in Ireland before. The type seems rare.
- Brachythecium albicans**, B. and S.—In fruit, on thatch, roadside near Moyallon, Co. Armagh. Perhaps not very uncommon, but nearly always sterile.
- B. salebrosum**, B. and S.—Marshy place by River Lagan, half a mile below Lisburn, Co. Down.
- Eurhynchium tenellum**, Milde.—Old mortared wall in "The Rounds," Lisburn, Co. Antrim.
- Plagiothecium Borrerianum**, Spruce.—At roots of ferns by the streamside above Colin Glen, Co. Antrim.
- Hypnum aduncum**, Hedw. (*Amblystegium Kneiffii*, B. and S.)—Boggy ground near the cairn on Whitemountain, Co. Antrim. We seem to have only three other localities in Ulster, and elsewhere in Ireland it is noted as belonging only to Co. Dublin and Co. Wicklow. On the Whitemountain it grows, not in tufts, but in solitary stems amongst *Breutelia arcuata*.
- H. polygamum**, Schp.—Margin of Boomer's Dam, Lisburn, and on the sandstone at Derriaghy, Co. Antrim; also shore of Lough Neagh, Co. Armagh. I think not before found in north Ireland.
- H. chrysophyllum**, Brid.—On damp blocks of granite in a bog at Glasdrumman, Co. Down. This seems to be the first record from the north. Its distribution in the south corresponds nearly with that of the last species.
- H. fluitans**, Linn., var. **falcifolium**, Ren.—Clayey ground at Boomer's Dam, Lisburn, Co. Antrim. A beautiful variety, which seems not to have been noted in Ireland before.
- H. vernicosum**, Lindb.—In a deep bog by the River Lagan, about a mile above Lisburn, Co. Down; and on Whitemountain, Co. Antrim. New to the northern list.
- H. Patientiæ**, Lindb.—With *H. polygamum* at Boomer's Dam, Lisburn.
- H. eugyrlum**, Schp.—Damp rocks by River Lagan, about a mile above Lisburn, Co. Down. Seems to be an addition to our northern list, and the only other Irish records that I have seen are from Killarney.
- H. scorpioides**, Linn.—Bogs on Whitemountain, Co. Antrim, and at Glasdrumman, Co. Down.
- H. giganteum**, Schp.—Not infrequent in deep swamps and bogs about Lisburn, in both counties, and fruiting in one of its localities. Through growing in deep bogs, where it is generally submerged, it has doubtless been sometimes overlooked, and is probably not so rare in Ireland as the very scanty records we possess would lead one to suppose.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Monkey from Mr. W. M. Smith, a Baboon from Mrs. Dane, a Badger from Mr. N. Hamilton, and a Zebra Cow from Major Lambart.

DUBLIN MICROSCOPICAL CLUB.

Nov. 13.--The Club met at Leinster House, Mr. GREENWOOD PIM, President, in the Chair.

Before entering upon the ordinary business of the meeting, a Presentation, consisting of a prismatic binocular glass and an inkstand, both bearing suitable inscriptions, was made to Mr. F. W. Moore, Secretary of the Club, in connection with his approaching marriage.

The President, on behalf of the members and ex-members who had contributed, expressed their high appreciation of Mr. Moore's services as Secretary of the Club, and their most cordial wishes for the health, and happiness of Mr. and Mrs. Moore.

Mr. Moore suitably replied, very warmly thanking the Club.

Mr. M'ARDLE exhibited dried specimens of *Dicranum uncinatum*, C. M. and a slide showing the distinctive leaf areolation which, on account of the rich and varied colours (often a golden green) makes a beautiful microscopic object. The plant was collected for the first time in Ireland last May by himself and Rev. Canon Lett, on the slopes of Mount Nephin, Co. Mayo, as noted in the *Irish Naturalist* for October, p. 196. It is also reported from Scotland and Sweden.

Mr. MOORE showed a complete flower, and sections through the labellum and sepals of *Bulbophyllum cylindraceum*. This little orchid is very rare, and is found in the warmer parts of the Himalayas. A complete inflorescence was also shown. The section through the labellum showed the peculiar cellular out-growths which gives the rough appearance to the surface of that organ.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

DECEMBER 10.—A meeting was held in the Museum, when an address was given by Francis C. Forth, Assoc.R.C.Sc.I., Principal of the Municipal Technical Institute, Belfast, on the subject, "The Municipal Technical Institute: its Aims and Aspirations."

BELFAST NATURALISTS' FIELD CLUB.

NOVEMBER 14.—CONVERSAZIONE.—This Society held a successful meeting in the Exhibition Hall of the Botanic Gardens. The following objects were displayed and explained by their respective owners:—Botanical exhibits—new and rare plants of County Down, by Rev. C. H. Waddell, B.D.; rare plants recently found in Ireland, by R. L. Praeger; rare mosses and hepatics, some new to Ireland, and brambles from the County Down new to science, by Rev. Canon Lett, M.A.; mounted botanical specimens, the property of the Municipal Technical Institute, by Mr. Forth; mounted specimens of plants collected on the summer excursions, by Mr. N. C. Carrothers. In the zoology section the living animals attracted much attention. Mr. Robert Patterson had Irish hedgehogs; Mr. Hamilton, Natterjack toad and Jersey toad; Mr. W. H. Gallway, lizards. These members also exhibited other objects—silk moths and skulls. Professor Symington had an exhibit of cuttlefish, collected on the coast of Normandy, while Mr. M'Lean exhibited an octopus and several other rare specimens, collected on the shores near Holywood during the present week. Mr. S. M. Stears's large and systematically-arranged collection, comprising birds' eggs, butterflies, and moths, represented much labour, which was duly appreciated by the numbers who crowded round his table. Mr. Nevin Foster had a fine instructive series of birds and eggs, illustrating comparative sizes of eggs laid by birds of about the same size. Mr. Welch, Mr. Lamont Orr, and Mr. W. A. Green had very large collections of land and freshwater shells excellently mounted and named. Mr. George C. Reilly exhibited shells and beetles. Miss M. K. Andrews's exhibit dealt very fully with the orbicular granite of Mullaghderg, the actual rock specimens, with micro-slides and photographs of the locality, dealing exhaustively with her subject. Mr. Wright, F.G.S., had foraminifera from the raised beach of Sherkin Island; Mr. Bulla, fossil fish from Carboniferous shale beds; Mr. Bell, Cretaceous cephalopoda, from Counties Antrim and Derry; Mr. James Orr, a beautiful collection illustrating sea-urchins, recent and fossil. Mr. T. Brown's collection of precious stones and gems found many admirers. The President (Mr. F. J. Bigger, M.R.I.A.) had a varied exhibit, consisting of the following:—An ancient Irish mether found near Monivea, Irish scales and weights, fragments of pottery recently discovered on Cave Hill, and a fine collection of weapons recently in use in New Zealand. Miss M. C. Knowles had objects from the pre-historic sites in County Clare; Mr. George E. Reilly, recent finds from the crannoges of Lough Mourne, including remains of the Irish elk; Mr. Robert Day, stone implements from County Antrim, fossil nautili and silicified wood from Lough Neagh; Mr. W. J. Fennell, measured drawings of souterrains in Antrim and Down. In the archæological section the exhibit that attracted the most attention was the valuable collection

belonging to Mr. Robert Day. This showed that the recent craze among the ladies of wearing strings of beads was only the revival of an old fashion prevalent among the ancient inhabitants of Ireland and Egypt. Mr. Day's collection contained many specimens collected from crannoges and other sites throughout Ireland and fine specimens from Egypt. Mr. J. J. Phillips had a number of drawings of Anglo-Norman architectural remains in Ireland. Madame Christen exhibited sketches of the pre-historic city of Devanna, on Dinnet Moor, photographs of Spanish gipsies as modern cave-dwellers near Seville, specimens of kiesulguhr from Aberdeen, and other objects. Mr. Vinycomb showed some delicate specimens of three-colour process work from large half-tone blocks; Mr. Patterson, water-colour sketches of Irish subjects; Miss Andrews, an early example of photography, and some very fine views of the Antrim coast painted by Andrew Nicholl, 1828. Mr. W. H. Phillips had a number of rare ferns and variations in mistletoe; Mr. J. H. Davies, rare mosses, collected in the Hebrides by Dr. Braithwaite, and some from Ireland. The structure and form of the leaf of one of these was seen through Mr. Gray's microscope, and much admired. Miss Wheeler had a few specimens of protective mimicry in animals and a trap-door spider's nest; Mr. Godfrey Macoun, delicate samples of objects in jade and agate from China. During the evening many gained instruction in Mr. Gray's micro-demonstration of form and colour in natural history objects. A business meeting was held in the course of the evening, when the President (Mr. F. J. Bigger) gave a short address. Speaking on the subject of the destruction of animals, he said it was painfully sad to see the often repeated paragraphs in our papers of the capture and destruction of wild birds and of our rarer animals, and of the bird visitors that occasionally favour us with their presence. Could not their habits be noted and their presence rejoiced in without their slaughter been occasioned? Particular reference was made to the loss science had sustained in the death of Professor Ralph Tate, one of the original members and founders of the Club. After the President's remarks a short lantern display was given, Mr. Hogg ably manipulating the lantern, and showing some fine examples of natural colour slides by the Sanger-Shepherd process. Mr. Welch showed a few slides illustrating phenomena in connection with blown sands and sand dunes at Newcastle, followed by illustrations of eggs of birds and snails. Mr. William Gray and Mr. St. J. Phillips showed a number of slides illustrating the summer excursions, and briefly described the objects represented. A number of new members were elected, and an interesting feature was the presentation of prizes for collections sent in in competition for the valuable prizes offered by the Club. These prizes were secured by Mr. W. A. Green for a collection of land and fresh-water shells, by Mr. James Orr for a collection of Liassic fossils, and by Miss Steele for a collection of flowering plants made on the first summer excursion to Scrabo.

NOVEMBER 28.—The President, Mr. F. J. Bigger, M.R.I.A., delivered a Lecture on "The Franciscan Friary of Killconnell in the County of Galway." The paper was fully illustrated by lantern slides.

DUBLIN NATURALISTS' FIELD CLUB.

NOVEMBER 19.—The President, Mr. GREENWOOD PIM, in the chair. Mr. W. B. WRIGHT (Hon. Sec.) read a paper entitled "The Use of a Waterfall," and explained its application to the study of glacial gaps. Mr. R. LL. PRAEGER gave an account of the discovery of certain plants during the past year, which were of special interest, and constituted additional records to those already published in *Irish Topographical Botany*. Specimens of the plants were exhibited. This paper is published in the present number of the Journal. Mr. PIM showed a large number of lantern transparencies of natural history subjects, chiefly snap-shots taken in the Zoological Gardens. Mr. H. J. SEYMOUR (Hon. Sec.) showed a set of photographs taken on the Club excursion to Lucan in August last. Messrs. F. H. Rochfort Brady, G. W. Lamplugh, F.G.S., F. M. Sellens, and A. H. Toppin, were elected members of the Club, and four nominations for membership were received.

NOTES.

ZOOLOGY.

Mysis relicta in Ireland.

Mr. Kane gives us an interesting note (*Annals and Mag. Nat. Hist.* (7) vol. viii., 1901, pp. 391-397) on the first discovery in Ireland of this remarkable shrimp-like Crustacean, by the late William Thompson. The latter found it in the stomach of a Pollan taken in Lough Neagh, in 1851. Since that date *Mysis relicta*, Lovén, has been discovered in many fresh-water lakes in Northern Europe as well as in North America.

Mr. Kane now places on record further information as to the occurrence of *Mysis relicta* in Ireland, having taken it plentifully in Lough Erne as well as in Lough Neagh. In size, the Irish form seems to approach more nearly to the Swedish race first described by Lovén than to the Russian. Mr. Kane is to be congratulated for having taken up the study of the freshwater Crustacea, a subject which might yet lead to important discoveries, and which has hitherto been much neglected by Irish zoologists.

Gonepteryx rhamni in Co. Cork.

A specimen of the Brimstone Butterfly, *G. rhamni*, was taken here on 15th May, 1901. I believe this is the first record of this insect's appearance in Co. Cork.

FRANCIS STAWELL.

Mallow.

Some Noteworthy Irish Lepidoptera.

Sesia formiciformis was inserted by Birchall in his "Catalogue of the Lepidoptera of Ireland," with the note—"Mr. Halliday.—No information as to locality." It is not surprising that Mr. Kane refused the species a place in his recent List. But it must now be acknowledged as a genuine member of our fauna, as Colonel J. W. Yerbury, who has been collecting during the past summer in the South-west of Ireland, took two males at Glengariff on June 13th. By his generosity they are now in the Dublin Museum. At Glencar, Co. Kerry, he secured a caterpillar of *Stauropus fagi*, which, having also been deposited in the Museum, has now pupated.

Epione advenaria has been taken near Limerick by Rev. Dr. R. A. M'CLean, three male and two female specimens having been forwarded by him to the Dublin Museum. This species does not appear in Mr. Kane's List, but he tells me that he has received it from Curraghmore, Co. Waterford. Among other captures made by Dr. M'CLean near Limerick, *Asthena candidata*, *Tephrosia punctularia*, and *Panagra petraria* are noteworthy.

Dianthæcia cæsia, known from the coasts of Cos. Cork and Kerry, has been traced northwards into Clare by Mr. P. H. Grierson, who captured a female near Lahinch.

GEO. H. CARPENTER.

Ctenistis quadra in Co. Waterford.

The above species is now very abundant in this neighbourhood. Last year large numbers of both larvæ and pupæ were brought to me by one of my parish school boys—a lad with a great taste for natural history. The larvæ were found on three different kinds of trees, viz., Oak, Beech, and Whitethorn.

I bred a large number, and had the pleasure of presenting a dozen specimens to Mr. Carpenter for the Museum of Science and Art, Dublin. The insect occurred again in great plenty this year. I was unable to collect many specimens, as I was from home on my holiday when it was in best condition; on my return I observed numbers of both sexes lying on the roads through the Curraghmore woods. During the last five or six years it seems to have enormously increased in numbers about here. I got one specimen on the 16th August, 1895 (*Irish Naturalist*, 1897, p. 282), and thought it then a great rarity.

WILLIAM W. FLEMING.

Coolfin, Portlaw.

New locality for *Paludestrina Jenkinsi*.

Last August, at Ben Head, Co. Meath, I came across three dead specimens of *Paludestrina Jenkinsi*, Smith, amongst marine drift. Mr. Welch has since verified them, and informs me that Mr. B. R. Lucas of Northwick found the species in September alive and extremely plentiful in pools along the Boyne between Drogheda and the sea.

A. L. MASSY.

Malahide.

Marine Mollusca at Port Stewart.

In the *Transactions of the Natural History Society of Glasgow*, vol. vi. (new series), 1899-1900, pp. 1-17, the Rev. G. A. Frank Knight gives a list of marine mollusca obtained by shore collecting by himself and friends at Port Stewart, Co. Derry, and institutes a comparison between the shells of the Antrim and Derry shores and those of the Clyde.

Of the 112 species and varieties obtained, Mr. Knight finds that fourteen are not found in the Clyde, or have been recorded on unsatisfactory evidence, and that ninety-eight are common to the Irish and Clyde shores. The following do not appear to have been previously recorded from the shores of Down or Antrim:—*Ostrea edulis*, var. *parasitica*, Turt.; *Pecten tigrinus*, var. *costata*, Jeff.; *Cardium tuberculatum*, L.; *Venus gallina*, var. *gibba*, Jeff.; *Purpura lapillus*, var. *imbricata*, Lmk.; *Pleurotoma levigata*, var. *minor*, Jeff.; and *Bulla hydatis*, L.

Additions to the list of Mollusca of Clonbrock.

In this Journal for September, 1896, Dr. Scharff gave a list of forty species of mollusca collected mainly in the demesne, and I was able to add seven species to this list in the June number, 1899. As the result of four or five days' collecting with the Hon. R. E. Dillon along the river at the little pond in the woods called the "Bath," and in drains between the deerpark and Kilconnell Abbey, I can add fourteen more species to the Clonbrock list. This includes the very local and rare *Amphipeplea* from Lough Callow, which Mr. W. F. de V. Kane obtained in fair numbers by dragging my light dredge through water-plants there, while he was collecting Entomostraca;—*Vitrina pellucida*, *Helix aspersa*, very local, but common; *Amphipeplea glutinosa*, *Planorbis spirorbis* in river; *P. contortus* in "Bath," drains, and Lough Callow; *P. crista* and var. *nautileus*, in drains and Lough Callow; *Valvata cristata*, *Sphaerium corneum*, *Pisidium amnicum*, in the river only; *P. pulchellum*, *P. fontinale*, *P. milium*, *P. obtusale*, *P. pusillum*. The *Pisidia* are plentiful in the district, especially in Lough Callow and the deep drains near the deerpark. Mr. C. Oldham kindly named the specimens of this genus for me.

In the lot from the Lough there were several extremely ventricose specimens, their breadth being equal to height and length, in that respect resembling *P. hibernicum*, but they are not nearly so angular in shape. Mr. Oldham cannot definitely refer them to any of the Irish species, and it is desirable to obtain more material at some future time.

This brings the total for Clonbrock to sixty-one species, most of these collected in the old woods and along the river banks in the demesne—a large number for such a limited area, and all new records for East Galway, which is marked blank in the last Census of the Conchological Society.

Belfast.

R. WELCH.

Porbeagle Shark from Dublin Bay.

The daily papers recently announced the capture of a shark in Dublin Bay, as if such a thing was an unheard-of occurrence. As a matter of fact, sharks are rather abundant on the Irish coasts, although they belong to species which do not attack man. Of the Irish sharks the largest is the Basking Shark—often called “Sun-fish” on the west coast of Ireland—which grows to a length of about 40 feet. A stuffed specimen, 27 feet long, from Inishbofin is in the National Museum.

The Porbeagle Shark (*Laema cornubica*, Gmel.), differs from the last-named chiefly in size and in the shape of the teeth—which in the former are large and lanceolate, while only very minute conical teeth are found in the Basking Shark. The specimen referred to as having been recently captured measured fully 9 feet in length, which is the size of the largest we have any record of from Irish waters. It was bought by Mr. M'Cabe, of the South City Market, who—after exhibiting it for some days—presented its head to the National Museum. In October, 1893, a Porbeagle Shark, of precisely the same dimensions as the one just referred to, was captured outside Kingstown Harbour in a net; and it was mounted by Messrs. Williams & Son, of Dublin, for the National Museum.

R. F. SCHARFF.

Science and Art Museum, Dublin.

Fish and Fishing off the Co. Down Coast.

The mention by Mr. R. Lloyd Patterson of the Monk Fish reminds me, that in the summer of 1890 I captured, off Glassdrummond Port, in a trammel net a good specimen of this species about $4\frac{1}{2}$ feet long. I had never seen one before, nor had any of the fishermen in the neighbourhood. I, therefore, photographed it, and it was identified (I think by Mr. S. A. Stewart) as an Angel Fish or Monk Fish.

In the same summer one of my boatmen caught—on a streaming line—a Mackerel with a rubber band round its body, which had eaten into the fish so as to cause an opening into its interior underneath the body. The fish, nevertheless, seemed quite lively, and took the bait. It is now in the Belfast Museum, College Square.

My notes of this year's doings recall, also, that I made a test of the popular belief that fish are attracted by a light. I procured a water-tight lantern, containing an electric lamp, with an accumulator and connecting cable. After fishing at anchor in 14 fathoms for Sea-bream one afternoon, the fish ceased taking as usual. I then got my lamp ready; and, by the way, one of the men who was very kindly offering his match-box got quite a shock when it suddenly shone out without the assistance of Bryant & May. I then lowered the lamp to the bottom, thinking that if the above supposition held good (though I had some

reason to doubt its accuracy) the fish would not only be attracted by the light, but would see to attempt a supper off the baits which hung seductively around. No bite was felt; not even an eel showed up, though we usually got these after dark.

After consideration, I felt rather inclined to think that sea fish would avoid a light, since they would probably connect it with the phosphorescence caused by an enemy moving in the water.

J. BROWN.

Longhurst, Belfast.

Departure of Swallows.

On the 28th of September I noticed a great many Swallows flying very low. This was a very stormy and warm day, which would bring down the insects. On the 6th of October I again saw them sitting in groups of about a dozen or so on the eaves of the houses, and occasionally flying round. On the 7th and 8th October they were flying backwards and forwards in front of the house. These were the last Swallows I noted this year about here.

W. H. WORKMAN.

Windsor, Belfast.

Quails in Co. Down.

It may interest your readers to hear (as I am informed by my cousin, Mr. J. S. Thompson, of Glassdrummond, near Annalong, Co. Down), that four Quails were observed in that neighbourhood last year, at a place called Turlo's Hill; also that some years ago a brace was observed on another farm in that neighbourhood, but the exact date is not known. My informant does not think that any nest was found.

J. BROWN.

Longhurst, Belfast.

Snow-Bunting in Co. Galway.

Mr. P. Davy, of Woodberry, Loughrea, has sent me a male Snow-Bunting (*Plectrophanes nivalis*) shot on December 4th out of a flock of six. The white feathers are still broadly tipped with brown.

R. E. DILLON.

Clonbrock, Ahascragh.

Waxwing near Londonderry.

I examined a fine specimen of Waxwing (*Ampelis garrulus*, Linn.), shot on 4th December, by Mr. A. Hutchman, at Bridgend, about five miles from Londonderry.

D. C. CAMPBELL.

Migration of Thrushes or Blackbirds.

On the night of October 26th the bright moonlight afforded me an unusually good view of nocturnal migration. On the morning of that day I had been struck with the great numbers of Blackbirds in the hedges, suggesting that a large incursion of that species had taken place—as we know to be usual at this time of year. About an hour after sunset the cries of Thrushes or Blackbirds passing overhead began to be audible. By 8 o'clock the moon was high, and from that time onwards until 11, by looking towards that part of the sky in which she was shining I could see, after every two or three minutes, a bird cross her disk, and shoot on rapidly towards the south-west. The total number which passed must have been very large, for I only saw those which crossed the most illuminated part of the sky; and even there, owing to the swiftness of their flight, a considerable number must have escaped my eye. Many of them uttered, while still in sight, the shrill soft call which is familiarly associated with the Song-Thrush, but which at this season is also much used by the Blackbird; and though I cannot say with certainty to which species they belonged, I think it probable that the latter—which had been observed in such exceptional numbers during the day—constituted the majority. The direction of the flight seemed in all cases uniformly south-west. The height at which the birds were flying was well above the level of the tree-tops, and, perhaps, 100 feet from the ground, but not more. The night was fine, with thin fleecy clouds—a better background for observation than perfectly clear sky, and the moon was practically full, actual full moon being due at 2.41 p.m. on the 27th. I heard, also, the cry of a Lark, so some other birds were passing.

C. B. MOFFAT.

Ballyhyland, Co. Wexford.

Black-tailed Godwit in Co. Wexford.

Mr. Robert Warren's experience of Irish sea and shore birds is so exceptional that I bow with all due deference to his warning on the subject of the numbers of Black-tailed Godwits supposed to have been recently seen on the coast of Co. Wexford (*Irish Naturalist*, May, 1901, p. 115). But I would point out that the occurrence was distinctly regarded by my informant as exceptional, and that the bird which he sent me as a specimen of one of those which had puzzled him actually was, without doubt, a Black-tailed Godwit. Thus, the occurrence of this bird on the Wexford coast at the time specified is proved; although, with Mr. Warren's letter before us, we shall do well to suppose that the flocks of Godwits seen were composed both of this and the commoner Bar-tailed species.

G. E. H. BARRETT-HAMILTON.

Leeuwspruit, South Africa.

Albino Curlew near Londonderry.

On 12th November a *pure white* Curlew (*Numenius arquata*), Linn., was shot at St. Johnston, near Londonderry.

D. C. CAMPBELL.

Templemore, Londonderry.

Strange Conduct of a Badger.

At Castle Crine, in Clare, there is a fine old rath or fort in the demesne not far from the house. It is circular, with an inner bank, a ditch or moat, and an outer bank. The interior part has been converted into a tennis ground, the moat into a walk, and the whole is an interesting feature of the demesne, and a favourite haunt of the ladies of the family. The banks of the rath have been the haunt of Badgers from time immemorial, but no member of the family had ever seen one unless it were trapped or dug out.

One afternoon, last September, four ladies entered the walk in the moat. A large Badger ran past them, actually touching the feet of one of them, and entered a hole in the bank. Presently it showed itself, but disappeared when one of the ladies clapped her hands, and the ladies walked on. The Badger emerged again and followed them. A Retriever which was with them attacked it, and a fight ensued, in which the Badger seems to have got the upper hand, for the dog ran away and took no further part in the proceedings, and the Badger again went to ground. Three of the ladies then went to tell the gamekeeper what had occurred, and the fourth remained to watch the earth. Luckily for her at this juncture she picked up a thick stick, for the Badger came out again, passed her, and gave chase to her three companions, and failing to catch them, returned and attacked her, in a determined manner. She got behind a tree and dodged it as best she could, striking at its head as it followed her round the tree. Meanwhile the shrieks of her companions soon brought assistance. The coachman was the first on the scene, followed by the keeper and the gardener, but before they arrived, the plucky lady had stunned the Badger, and was no longer in danger. The Badger turned out to be a very large female. The keeper says that on the morning of the same day he killed, more than a mile from the rath, a young Badger. This is an accurate account of a most curious occurrence, and I hope that some authority on Badgers will let us know if such a thing ever happened before, and what can be the explanation of it.

I may add that in my county (Louth) Badgers are certainly increasing in numbers. They took up their abode in my own woods last summer for the first time, and there is a colony in the rocks at Clogher Head. In fact, they are all over the country, and in many places where their presence is not suspected. They did good service here by rooting out wasps' nests, which were very numerous last year.

G. H. PENTLAND.

Black Hall, Drogheda.

Notes on the Hedgehog.

Perhaps my experience may help Mr. Patterson in determining the time of year at which the Hedgehog produces its young.

About three years ago my men were mowing, and I happened to go up to the top of the lawn where they were at work. I had a small dog with me, who became very excited around a clump of long grass and briars under some trees. On investigating the clump I discovered in its centre a very cosy nest, which contained a family of Hedgehogs—a mother and her four children. The young were fine strong ones, about a quarter size of the mother, with their spines quite matured, and able to run about as fast as the parent. Judging from their size I should say they were at least three or four months' old. It was the last week in July I found them, so that assuming my estimate of their age to be nearly correct, they would be born in March or early in April. I am sorry I did not take a photograph of the nest and its inhabitants.

I am inclined to agree with Mr. Patterson's suggestion regarding the fat, for the following reasons—(1) because Hedgehogs do not move about much, if at all, in winter in search of food, and (2) in most cases they could find no food, at least the sort they live on during the summer, so that this fat *is their winter larder*.

WM. M'ENDOO.

Tanderagee.

Large extinct Red Deer of Ireland.

In his paper on "Irish Red Deer" (*Irish Naturalist*, May, 1901, pp. 101-104), Mr. A. Loftus Otway describes a remarkable pair of horns of the extinct Irish Red Deer, which were discovered in the reclaimed alluvium south of Wexford Harbour in February last. He also mentions the find of a second pair of horns, and of a single antler in separate positions in the same neighbourhood. Through the kindness of their finder I enjoyed the opportunity of examining and measuring these specimens. The dimensions are, I think, worthy of record in the *Irish Naturalist*:—

Greatest length of antler along beam,	. . .	30 inches.
Length of same cutting off curves,	. . .	24 "
Girth of burr,	. . . . .	6½ "
Thickness of beam between brow and bez tines,	. . . . .	2 "
Do. above bez tine,	. . . . .	2 "
Do. decreasing to,	. . . . .	1½ "
Do. at base of cluster,	. . . . .	2½ "
Points (including one quite small point),	. . . . .	11 + ? "

The second complete head, probably a deformity, had enormously long antlers, reaching the length of 40 inches, but with only 9×9 points.

It is noteworthy that such completely different heads as that described by Mr. Otway and the second one in this note should have been found in such close proximity.

G. E. H. BARRETT-HAMILTON.

Leeuwspruit, South Africa.

REVIEWS.

IRISH PROTOZOA.

On Some British Freshwater Rhizopods and Hellozoa. By
G. S. WEST, B.A., F.L.S. (*Journ. Linn. Soc.*, vol. xxviii. (Zoology),
1901, pp. 308-342).

Since the time when the late William Archer conducted his memorable researches among these lowly-organized Protozoa, that branch of zoology has been much neglected in Ireland. It is, therefore, with much pleasure that we announce that Mr. West, the Professor of Natural History at the Agricultural College of Cirencester, has taken up this interesting subject again. Although his paper deals principally with British records, he refers also to specimens collected in the north and west of Ireland. Mr. West does not inform us whether the species he mentions as Irish had been previously recorded by Archer or any other authority, or whether he has consulted the *Proceedings* of the Dublin Microscopical Club for records of the Irish freshwater Protozoa. It is also desirable to have more precise information as to the exact position of several of Mr. West's localities.

Cochliopodium bilimbosum, Leidy, is now recorded from Lough Neagh and from Gortahork, Co. Donegal.

Arcella artocrea, Leidy, a very rare species, was taken at Churchill, Co. Donegal. The only other locality in the British Islands where this North American form has been found, is in North Wales.

Centropyxis aculeata, Stein.—Exceptionally large specimens of this species were met with near Athry Lough, W. Ireland.

Difflugia pyriformis, Perty, was taken in Lough Shannacloontippen, and at Ballynahinch, W. Ireland.

Difflugia globulosa, Duj., occurred in a small form at Lough Guitane and on Torc Mountain, near Killarney.

Helcopera petricola, Leidy, was found near Glenties, Co. Donegal.

Englypha brachista, Leidy, another North American species was discovered on submerged *Sphagnum* in the small lakes east of Recess, Co. Galway.

Cyphoderia ampulla, Leidy, with prominent mamillate process at the fundus, was noticed in Lough Neagh.

Diplophrys Archeri, Barker, of small size, was found in Lough Gatny, Co. Donegal.

Ciathrulina elegans, Leidy, occurred in the vicinity of Lough Neagh, on the County Armagh side.

R. F. S.

ORNITHOLOGY MADE EASY.

In the December number of the *Irish Naturalist* I see a review signed "C.B.M.," of an elementary book on Birds, by David J. Price. I know nothing of the book or its author. But I object very strongly to the style of that criticism.

No book can be perfect; omissions can be rectified, mistakes or "blundering statements," as "C.B.M." so crudely calls them, *of course should not occur*. They also can be corrected. If the worst is the one mentioned by "C.B.M.," I do not see that great harm is done, as viewing the price of the book and its non-scientific character it can never have had any pretension to become a scientific ornithological handbook. It is not necessary or expedient to chastise an author with scorpions.

There is one sentence which, to my mind, is very ill-advised, viz.:—"We venture to think that the *beginner* who needs (or imagines he needs) 'this kind of 'ready aid' might as well remain in ignorance, which has 'hitherto sat so easily upon him.'"

"C.B.M." writes as if every student of ornithology had a library at his command, either in his house or in the neighbourhood. Ornithological books are very expensive. Their cost prohibits many from following their bent in that line unless they live near museums, public libraries, &c.

Such books, also, are full of scientific terms and names and are, therefore, useless to uneducated people.

If we want to extend our knowledge of the habits, migrations, &c., of our birds, we must have a book for non-scientific semi-educated people, and which can be purchased at a small cost.

I have tried for years to obtain such books to distribute in this district to gamekeepers, caretakers of bogs, small farmers, &c., on ornithology, entomology, botany, but I invariably find that such books are either too scientific in phraseology or are written for children; very prettily written, but for children only.

I would, therefore, ask scientific writers to consider this fact, viz., that their very humble brothers could and would do much to assist them in their great work, in solving many of Nature's problems, if they were allowed to help. They are debarred from this at present. Terms that are quite familiar to any educated naturalist are *Greek* to the man in a bog cabin—yet he could be a most useful observer, and with a book which he could understand would take deep interest in the subject.

Scientific men also could be more lenient with their less well-informed followers. Such a critique, which I regret to have seen in this Magazine, is quite sufficient to deter any man from ever correcting mistakes in a book already written, and prevent any non-scientific but keen observer from writing a popular non-scientific book on subjects on which we all want information.

R. E. DILLON

Clonbrock, Co. Galway.

Through the Editors' courtesy, I have seen the above strictures on my review of what I considered to be an absurdly conceived and indifferently executed work. I admit, at once, that errors and omissions do not of themselves justify wholesale severity in a critique. They should be pointed out gently, when the plan is otherwise good. But my chief objection was not to the errors or omissions, nor to any points of detail, but to the plan. While I do not share Mr. Dillon's fear that such remarks as mine may deter non-scientific men from writing on natural history, I shall be glad if they tend to avert the publication of botanical or entomological "primers" in which the plants are arranged according to their heights, or the moths according to the amount of space they may occupy in a cabinet. Such "short cuts" to learning are not addressed to the *capacity* of any class of learners, however humble; they are simply addressed to the *temper* that will not expend more than a minimum of time in the acquisition of knowledge; and I cannot retract my opinion that it is undesirable to attempt to coax such careless or lazy persons into the ranks of zoologists at all. A glance at the book in question would have shown Mr. Dillon that it is not addressed to the semi-educated. Its cost is, indeed, small; but surely the student who has most right to be warned against throwing his money away is he who has least to throw. A cheap book, therefore, should not be handled with misleading tenderness.

C. B. MOFFAT.

Ballyhyland, Co. Wexford.

A STUDENT'S DIARY

"Knowledge" Diary and Scientific Handbook for 1902.

Pp. 112 and 408. London: "Knowledge" Office, High Holborn.
Price, 3s.

The second issue of this annual will be warmly welcomed by students of science. As before, the diary is designed on a liberal scale of space, and the astronomical notes and articles, which form the most prominent feature of the reading-matter, may be relied upon as trustworthy and valuable. Natural science is represented by some useful "Hints on the Microscope" by M. I. Cross, and some "Aids to Field-Botany" by R. Ll. Praeger. The volume contains only one objectionable feature. We remember that last year, strictures were passed by some of our contemporaries on the bad appearance of a type-written advertisement on the front cover. We rejoiced to miss that advertisement this year, but on looking through the book, we find what is far worse—advertisements on pages alternating with the scientific articles.

MARINE BOULDER CLAY IN COUNTY CORK.

BY T. MELLARD READE, F.G.S.

WITH NOTES AND LISTS OF FORAMINIFERA

BY JOSEPH WRIGHT, F.G.S.

HAVING spent my summer holidays last year in the South of Ireland, I took the opportunity of examining the nature and the distribution of the drift deposits in a part of County Cork.

This research was only incidental to other geological field work, and was undertaken at the suggestion of Mr. Joseph Wright, F.G.S., who had hitherto failed to find Foraminifera in the Boulder Clays from that region.

My first impressions from the nature of the Boulder Clay met with were certainly unfavourable as regards the probability of its yielding *Forams*, or indeed any microzoa. Eventually on the south-west side of Clonakilty Lough, east of the embankment over the Cloheen strand, I observed on the margin of the lough a more favourable-looking yellow sandy Boulder Clay, packed in places with slaty-rock fragments. This drift yielded a fairly abundant amount of foraminifera, as the following report from Mr. Wright will show:—

NO. 2. BOULDER CLAY, CLONAKILTY.—Weight of clay, 24·8 oz., Troy.

After washing, fine, 9 oz.; coarse, 8·5 oz. Foraminifera common.

FORAMINIFERA.

Millolina sp.—One broken specimen.

Textularia sp.—One specimen.

Bullmina pupoides, d'Orb.—One specimen.

B. fusiformis, Will.—Very rare.

B. marginata, d'Orb.—Frequent.

Bollvina punctata, d'Orb.—Rare.

B. plicata, d'Orb.—Rare.

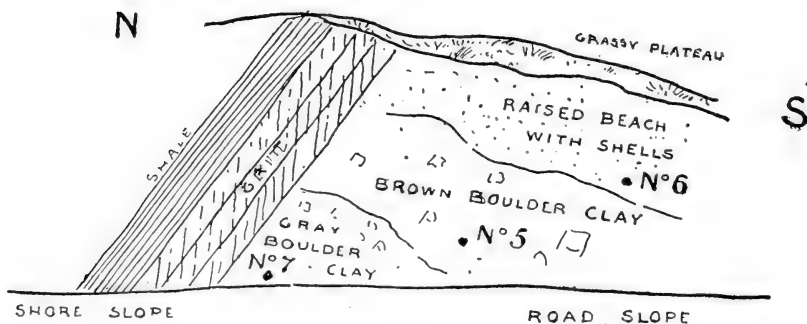
B. difformis (Will.).—Rare.

B. dilatata, Rss.—One specimen.

Cassidulina lævigata, d'Orb.—Frequent.

- Cassidulina crassa**, d'Orb.—Common.
Lagena sulcata (W. & J.).—One specimen.
L. squamosa (Montag.).—Very rare.
L. lævigata (Rss.).—Very rare.
L. marginata (W. & B.).—Frequent.
L. Orbignyana (Seg.).—Very rare.
Uvigerina angulosa, Will.—Rare.
Globigerina bulloides, d'Orb.—Very common.
Patellina corrugata, Will.—One specimen.
Discorbina globularis (d'Orb.).—Very rare.
D. rosacea (d'Orb.).—Very rare.
D. nitida (Will.).—Rare.
Truncatulina lobatula (W. & J.).—Common.
Pulvinulina sp., near *P. auricula* (F. & M.).—One specimen.
P. Karsteni (Rss.).—Rare.
Rotalia Beccarii (Linné).—Rare, one large specimen, the others very small.
Nonionina depressula (W. & J.).—Very common.
Polystomella striato-punctata (F. & M.).—Very common.
 608 foraminifera were obtained from this clay, 313 of them being referable to *Globigerina bulloides*.

The next section met with, of which the following is a sketch, was at the northern extremity of Sherkin Island, where the north road terminates on the beach :—



I think the height to the grass surface was about eight feet, but I did not measure it. Mr. Wright says of the Boulder Clays from this section :—

NO. 5. BOULDER CLAY, SHERKIN ISLAND.—Weight of clay, 19·2 oz., Troy. After washing, fine, 8 oz.; coarse, 1·5 oz. Foraminifera rare (30 specimens).

FORAMINIFERA.

- Textularia gramen**, d'Orb.—Very rare.
Bullmina pupoides, d'Orb.—One specimen.
Cassidulina lævigata, d'Orb.—One specimen.
C. crassa, d'Orb.—One specimen.
Uvulgerina angulosa, Will.—One specimen.
Globigerina bulloides, d'Orb.—Frequent.
Truncatulina lobatula (W. & J.).—Rare.
Rotalia Beccarii (Linné).—Very rare.
Polystomella striato-punctata (F. & M.).—One specimen.

NO. 7. GREY BOULDER CLAY, SHERKIN ISLAND.—Weight of clay, 21·2 oz., Troy. After washing, fine, 5·9 oz.; coarse 7·2 oz. Foraminifera rare (31 specimens).

FORAMINIFERA.

- Gaudryina filiformis**, Berth.—One specimen.
Bulimina pupoides, d'Orb.—One specimen.
Bollvina difformis (Will.).—Very rare.
Cassidulina lævigata, d'Orb.—Rare.
C. crassa, d'Orb.—Very rare.
Lagena marginata (W. & B.).—One specimen.
Globigerina bulloides, d'Orb.—Rare.
Discorbina obtusa (d'Orb.).—One specimen.
D. globularis (d'Orb.).—One specimen.
D. sp.—Rare.
Truncatulina lobatula (W. & J.).—Rare.
Nonionina depressula (W. & J.).—Very rare.
Polystomella macella (F. & M.).—Rare.
P. striato-punctata (F. & M.).—One specimen.
Operculina ammonoides (Gron.).—One specimen.

All the forams from the preceeding Boulder Clays are of the usual dwarfed characters, contrasting strongly with those from the Raised Beach (No. 6), which are most abundant and well grown.

Mr. Wright says of this specimen (No. 6) of Post-glacial Sand :—

NO. 6. RAISED BEACH OVERLYING BOULDER CLAY, SHERKIN ISLAND.—Weight of clay, 16 oz., Troy. After washing, fine, 5 oz.; coarse, 6·7 oz. Foraminifera and Ostracoda most abundant.

FORAMINIFERA.

- Biloculina ringens**, var. **elongata**, d'Orb.—Very rare.
B. depressa, d'Orb.—Rare.

- Spirolocullina limbata**, d'Orb.—One very small specimen.
S. canaliculata, d'Orb.—Very rare.
S. tenuiseptata, Br.—Rare.
Miliolina oblonga (Montag.).—Very rare.
M. seminulum (Linné).—Very common.
M. Auberiana (d'Orb.).—Rare.
M. contorta (d'Orb.).—Rare.
M. bicornis (W. & J.).—Very rare.
M. secans (d'Orb.).—Rare.
M. tenuis (Cz.).—One specimen.
M. subrotunda (Montag.).—Very common.
Haplophragmium canariense (d'Orb.).—Very rare.
Trochammina squamata, J. & P.—One specimen.
Textularia gramen, d'Orb.—Common.
T. concava, Kar.—One specimen.
Spiroplecta sagittula (Defr.).—One small specimen.
Bulimina pupoides, d'Orb.—Very common.
B. elegans, d'Orb.?—Very rare.
B. fusiformis, Will.—Frequent.
B. marginata, d'Orb.—Common.
B. elegantissima, d'Orb.—Very rare.
Virgulina Schreibersiana, Cz.—Rare.
Bolivina plicata, d'Orb.—Common.
B. textularioides, Rss.—Rare.
B. difformis (Will.).—Common.
B. dilatata, Rss.—Common.
Cassidulina lævigata, d'Orb.—Very common.
C. crassa, d'Orb.—Common.
C. Bradyi, Norman.—Very rare.
Lagena globosa (Montag.).—Rare.
L. lævis, var. **clavata** (d'Orb.).—Rare.
L. sulcata (W. & J.).—Frequent.
L. Williamsoni (Alcock).—Common.
L. striata (d'Orb.).—Very rare.
L. ilneata (Will.).—Rare.
L. semistriata (Will.).—Rare.
L. squamosa (Montag.).—Very common.
L. hexagona (Will.).—Frequent.
L. lævigata (Rss.).—Rare.
L. quadrata (Will.).—One specimen.
L. fimbriata, Br.—One specimen.
L. marginata (W. & B.).—Frequent.
 var. **tenuistriata**, Br.—One specimen.
L. lagenoides (Will.).—One specimen.
L. bicarinata (Terq.).—Rare.
L. Rizzæ (Seg.).—Very rare.
L. quadricostulata, Rss.—Frequent.
 var. **Walleriana**, Wright.—Rare.
L. Orblignyana (Seg.).—Common.

- Nodosaria scalaris** (Batsch).—Rare.
Cristellaria rotulata (Lamk.).—Rare.
C. crepidula (F. & M.).—Rare.
Polymorphina lactea, var. **amygdaloides**, B. P. & J.—Rare.
P. gibba, d'Orb.—Rare.
P. compressa, d'Orb.—One specimen.
P. communis, d'Orb.—One specimen.
P. myristiformis, Will.—One specimen.
Uvigerina angulosa, Will.—Common.
U. canariensis, d'Orb.—One specimen.
Globigerina bulloides, d'Orb.—Common.
Patellina corrugata, Will.—Rare.
Discorbina globularis (d'Orb.).—Frequent.
D. rosacea (d'Orb.).—Common.
D. nitida (Will.).—Frequent.
D. Bertheloti (d'Orb.).—Frequent.
Planorbulina mediterranensis, d'Orb. —Frequent.
Truncatulina lobatula (W. & J.).—Most abundant.
T. variabilis, d'Orb.—Rare.
Pulvinulina auricula (F. & M.).—Rare.
P. sp. near auricula (F. & M.).—Very rare.
P. patagonica (d'Orb.).—Very rare.
P. Micheliniana (d'Orb.).—One specimen.
P. Karsteni (Rss.).—Rare.
Gypsina inhærens (Sch.).—Rare.
Rotalia Beccarii (Linné).—Frequent.
Nonionina depressula (W. & J.).—Common.
N. pauperata, B. & W.—One specimen.
N. turgida. Will.—Rare.
Polystomella striato-punctata (F. & M.).—Very common.
P. crispa (Linné).—Common.
P. macella (F. & M.).—Common.
Operculina ammonoides (Gron.).—Frequent.

In this clay, Foramanifera occur in great profusion, many of the specimens being large in size; several of the species are the same as those which now occur off the West and South-west of Ireland, and which are either very rare or absent from other parts of the coast. The following interesting species were met with :—*Spiroloculina tenuiseptata*, *Cassidulina Bradyi*, *Lagena fimbriata*, *Polymorphina myristiformis*, *Pulvinulina Micheliniana*, *Gypsina inhærens*, and *Operculina ammonoides*.

At Old Court, halfway between Skibbereen and Baltimore, I took a specimen from what appeared to be Raised Beach, but the foraminifera yielded were poor and scanty, as the following list will show :—

- No. 4. RAISED BEACH, OLD COURT, SKIBBEREEN.—Weight of clay, 10·7 oz., Troy; after washing, fine, 2·3 oz.; coarse, 4·4 oz. A few foraminifera.

FORAMINIFERA.

Bullmina marginata, d'Orb.—One specimen.

B. pupoides, d'Orb.—Very rare.

Globigerina bulloides, d'Orb.—One specimen.

Truncatullina lobatula (W. & J.).—Rare.

Polystomella striato-punctata (F. & M.).—One specimen.

These Boulder Clays of County Cork in the main, I believe, represent the Marine Boulder Clays of Great Britain, of which Mr. Wright and I have made many examinations and published much.¹

In the short time at my disposal and being occupied as I was with other geological problems and in sketching, very much could not be done. In all probability a more thorough search among the islands, loughs, and coast lines would reward the patient investigator who has previously worked in other districts and knows how to look for Marine Boulder Clays.

It may be here observed that the bulk of the compact, very strong grey Boulder Clay distributed over the county, appears to underlie the Marine Boulder Clay, as it does in Great Britain, where the two are found in juxtaposition. Specimen No. 8 of this clay taken at Baltimore yielded no microzoa.²

In the valley of the River Ilan, about one mile north of Skibbereen, is a mound of sand, gravel, and pebbles, considerably current-bedded, the material being well rounded and worn. This seems to be a glacial river deposit, and was quite destitute of any organic remains so far as my examination extended.

¹ The following are among the communications, viz. :—Description of the strata exposed during the construction of the Seacombe Branch of the Wirral Railway, Cheshire. Reade and Davies.—*Proc. L'pool Geol. Soc.*, Session 1894-5, p. 327. Foraminiferal Boulder Clay at Great Crosby and Blackpool.—*Ibid.*, Session 1893-6, p. 387. The Glacio-marine Drift of the Vale of Clywd.—*Q.J.G.S.*, vol. liii., 1897, pp. 341-348. The gypsum boulder of Great Crosby.—*Proc. L'pool Geo. Soc.*, Session 1898-9, p. 347. Foraminiferal Boulder Clay at Riverside, Seacombe, Cheshire.—*Ibid.*, p. 357. Drift on Moel Tryfaen: Report of Committee, British Association Report, 1899, pp. 419-421.—*Geol. Mag.*, 1900, p. 115.

² It is stated by Jukes in several of the *Memoirs* of the Geological Survey of Ireland that he has frequently searched the drift in the South-west of Ireland for marine shells, but never succeeded in finding any. I cannot find in these memoirs any reference to Post-Glacial marine deposits.

At the bridge over the Ilen, about two miles above or north of Skibbereen, on the left bank are to be seen in the bed of the river well-moutonnéd and rounded rocks, with unmistakeable striæ scored thereon, crossing the edges of the slaty strata and bearing N.W. and S.E. Similar rocks were observed on the shore with striæ bearing in the same direction. The rounded boss in the stream had a scooped-out hollow in it. These striæ seem to point to the Caha Mountains and the Macgillicuddy's Reeks as the origin of the glaciers that produced them.¹

Connected with these land-ice deposits some remarkably fine micaceous banded silts are to be seen at the side of the road near to O'Donovan's Lake, and also in small beds in the mound or esker already described. The material of those silts is as soft as flour to the touch.

Perhaps the foregoing information is not much to generalise from, but, so far as we know, the facts conform to and help to sustain similar observations in Great Britain.

The Post-Glacial movements of the land in Ireland, as exhibited in the raised beaches and the bays and fiords and the submerged peat, are doubtless capable of correlation with similar oscillations of the level of the land in Great Britain.²

The observations detailed in this paper and the abundant yield of foraminifera from the Post-Glacial material examined, strengthen the evidence adduced by Mr. Kinahan in his "Geology of Ireland" of the existence of a continuous 10-feet raised beach, which he has traced round the coast and loughs of the South of Ireland.

¹ In the *Memoirs* of the Geological Survey of Ireland, Explanations of Sheet 192 and part of Sheet 199 (Bantry and Dunmanus Bays), Beete Jukes says:—"There is, however, no district in the British Islands, perhaps, in which the proof of what is called glaciation is so universal and well-marked." He also notices that glacial scratches often run N.W. and S.E., though other directions are common, but more frequently approximating to N. and S. than to E. and W.

² In the Explanation of the Sheets of the Geological Survey of Ireland including Clonakilty, Courtmacsherry, &c., p. 27, it is stated "submerged peat bog is found at dead low water of spring tides on the western side of Courtmacsherry Bay, as on so many parts of the south coast of Ireland," and that "these and other similar facts to be found round all the coasts of Ireland seem to point to a recent depression of the whole island."

THE FATHER OF IRISH FIELD CLUBS.

BY S. A. STEWART, F.B.S. ED.

(Read before the Belfast Naturalists' Field Club, 30th November, 1901.)

IT is with feelings of deep regret that I, this evening, announce the death of a distinguished scientist, Prof. Ralph Tate, F.G.S., F.L.S., the virtual founder of the Belfast Naturalists' Field Club. As many of those who have been added to the Club in recent years are unaware of the circumstances which led up to Mr. Tate's connection with Belfast and its Naturalists' Club, I shall very briefly state how it came about. The Government Department of Science and Art was originated in 1852 with the object of spreading scientific and artistic culture throughout the country. One of its methods was by originating courses of scientific lectures where such were desired. In pursuance of this object Prof. Jukes, of the Geological Survey, was commissioned to lecture on geology in Belfast. Some of you will, perhaps, remember these very profitable meetings, which were held in the old Music Hall, May-street. Prof. Jukes succeeded in raising a considerable amount of interest in his subject, and I presume that some here have not forgotten his concluding meeting, which was held at the Cave Hill quarries, and was attended by some 300 hearers. This was the first scientific field meeting of Belfast folks, and revealed a hitherto unsuspected want. Thus the ground was prepared for the success of the coming man, and for the advent of an organization which should combine the teaching of the lecture hall with the practical application of its lessons by visits to choice scenes where those abstract lessons might be viewed in the concrete. A further forward movement was now made by the formation of a local lecture committee, who succeeded in arranging with the Science and Art Department for the establishment of Science Classes in Belfast, which should be followed by examinations and prizes. To the credit of the Natural History and Philosophical Society it may be stated that the sixteen members of this committee were all active members of that organization. What was wanted here was an all round man, with ability to expound and enthusiasm to inspire, and this was obtained when the Department sent us Mr. Tate to conduct our classes.

The subjects taught by him were geology, mineralogy, systematic botany, vegetable physiology, zoology, animal physiology, and physical geography, and the success attending the teaching was most marked. At that time the Department had classes in only eleven localities, but of the thirteen first class prizes awarded in geology, eleven went to Mr. Tate's pupils. Eight medals were given at these examinations, six of which came to Belfast. Some of those successful students are still with us. The foregoing may appear to some unnecessarily lengthy, but it leads up to Mr. Tate's influence on the birth of the Club. These classes in the Museum continued until the spring of 1864, and early in 1863 Mr. W. T. Chew, who has long since left Belfast, and whose subsequent history I am unable to trace, wrote in the *Northern Whig* explaining the working of Naturalists' Field Clubs, and urging the formation of one in this town. This was taken up at once by some of the pupils of the geological class, who met Mr. Chew, and arranged for him a meeting with their teacher. Mr. Tate drew up an outline of the organization of the Club, a meeting was summoned, many names were secured as a start, and then an inaugural meeting was held, a code of rules adopted, and officers appointed; and thus was launched the organization which has called us here to-night after a most successful career of almost thirty-eight years.

Ralph Tate was a native of Alnwick, and was descended from an old Northumbrian family, several of whose members have been distinguished for their love of natural science. His father was Thomas Tate, the author of a number of educational works, and his uncle, George Tate, F.G.S., was a prominent north country geologist, whose influence first incited his nephew to scientific studies; the latter began his geological work when only twelve years old. At seventeen he won a free exhibition at the London School of Mines. Soon after he was at the head of a geological class at the Polytechnic Institution, and subsequently senior master of the Bristol Trade and Mining School, and curator to the Geological Society. Having received his scientific training at the School of Mines, and his capability of imparting instruction being proved, he was sent out to several localities as a science teacher under the Department of

Science and Art. During the three winter sessions in which he taught in Belfast, Lisburn, Carrickfergus, etc., there was quite a revival of the old scientific spirit which prevailed there a century ago. Mr. Tate did not confine himself merely to the work for which he was paid, but laboured with a steady quiet enthusiasm in an examination of the flora, fauna, and geology of the district. In 1863 he published his *Flora Belfastiensis*, being an enumeration of the plants found within a radius of fifteen miles from Belfast. This was the first local Flora published in the North of Ireland. He also prepared a paper describing the Irish Cretaceous rocks, and figuring some of the new species of fossils he found therein. He also explored the Lias beds, of which hitherto we knew but little, and his paper on this subject, communicated to the Belfast Naturalists' Field Club, has remained until now as the standard of reference. Another paper, in the *Quarterly Journal* of the Geological Society, dealt with the *Ammonites angulatus* zone of the Lower Lias. He also read a paper on the Middle Lias of County Antrim. Of this obscure subject nothing more is known up to the present time. After Mr. Tate's engagement in the North of Ireland was ended he had an appointment as assistant secretary to [the Geological Society of London; from thence he went to Central America as mining surveyor in Nicaragua. Here he did a good deal of work, paying considerable attention to terrestrial mollusca, and published an account of the shells met with. A good collection of plants was also made, but unfortunately they were spoiled and rendered useless by damp during the rainy season of that country. Mr. Tate's stay in America was not long, and soon after his return to London he took charge as organizer and conductor of the Mining School for Workmen in Durham, and in 1875 was appointed to the chair of natural science in the University of Adelaide, South Australia. This professorship he held until his decease. The wide field of research which he saw before him in a region where much of it was virgin ground for the naturalist, must have been an intense stimulus to a man like Tate. Here he set to work in earnest, and every year papers were produced dealing with some aspect, either of the geology, botany, or conchology of the country. I have a list of eighty-five of these papers communicated to

the Royal Society of South Australia from 1881 until the present year. Australian science has suffered severe losses during the last few years—Baron Von Mueller, a great friend of Tate, and co-worker with him in several researches, predeceased him by some four years, and still more recently our own M'Coy, the veteran geologist.

Prof. Tate's scientific work in South Australia was highly appreciated in that country. His funeral at Adelaide was attended by a great concourse of the inhabitants, the Chancellor, Vice-Chancellor, professors, and about seventy students of the University followed the hearse in academic robes. Subsequently a meeting of students was held, and it was resolved to take steps to perpetuate his memory by placing a mural tablet on the walls of the new Geological Museum, and to establish a Tate medal.

Museum, Belfast.

OBITUARY.

WILLIAM WILLIAMS.

With sincere regret we record the death of Mr. William Williams, for many years the head of the well-known naturalist's business in Dame-street, Dublin; he passed away on December 10th, at the age of 89 years. An earnest student of geology and general natural history in his younger days, Mr. Williams made his reputation by a special study of the extinct Great Deer or "Irish Elk," travelling widely over Ireland in search of the remains of this animal, whereof he amassed a large collection. Skeletons mounted by him may now be found in many of the European museums, as well as in Australia and America, while papers embodying the results of his researches appeared in the *Proc. R. Dublin Soc.*, and the *Geological Magazine*, 1881. Failing health during recent years obliged Mr. Williams to leave the Dame-street establishment in the hands of his sons. His lamented death severs a link between us and the naturalists of a past generation.



ENTOMOLOGICAL NOTES FROM ULSTER.

BY C. W. BUCKLE.

SINCE the publication in the *Irish Naturalist*, in January, 1900, of a list of beetles taken in the Foyle district, my opportunities for collecting have been somewhat limited, and chiefly confined to the Belfast district. In the following list, which only includes the more interesting species which I have met with, those marked (*) are recorded for the first time in Ireland.

BEETLES.

The nomenclature used is that of Sharp and Fowler:—"Catalogue of British Coleoptera," 1893.

Carabus arvensis—May-June. Several examples at the summit of Collinward Mountain, Co. Antrim; height, 1,196 feet. Mr. H. Booth also took this species at the same spot.

Dyschirius salinus—Sept. A single example taken on bank of river between Comber and Strangford Lough, Co. Down.

Badister sodalis—Oct.-Nov. Occurs under stones well above flood level, Colin Glen, Co. Antrim. Haliday recorded this from Belfast district; and it has also been taken in the West of Ireland, but is rare.

Anchomenus oblongus—Dec. Very plentiful along shore of L. Neagh, near Shane's Castle, at highest flood level.

Bembidium nitidulum—April. Two examples at foot of disused limestone quarry from which the winter water had receded, Cave Hill, Co. Antrim.

B. assimile—Dec. Fairly common on borders of L. Neagh, near Shane's Castle.

B. lunatum—July. Under sea-weed at Magilligan, Co. Derry. This is the first record from the mainland of Ireland; but it was taken a few years ago by Mr. J. R. Hardy, on Rathlin Island.

B. femoratum— } March. These two species were taken under the
B. flammulatum } same piece of turf growing on the wing wall
of the weir bridge above Drum Bridge, over Lagan Canal.

Patrobis excavatus—July. A single example at foot of Collinward Hill, near Glengormley, Co. Antrim. Rare.

Pogonus chalcus—Sept.-Oct. On salt marsh, Strangford Lough, between Comber and Newtownards.

Hydroporus incognitus—May. Borders of small spring, Cave Hill. Plentiful at this spot, but very local. Previously recorded by me from the Foyle district for the first time.

***H. obsoletus**—Oct. A single example from the same situation as *Dysch. salinus*, Strangford Lough. I have just discovered another example among some duplicates of *H. memnonius* from Foyle district.

- *Oxypoda vittata**—June. By sweeping at Doagh or Ballyclare, Co. Antrim; verified by M. Fauvel.
- O. alternans**—Sept. From fungi, in company with *Autalia*, near banks of Lagan, near Belfast.
- Ocyusa incrassata**—July. Taken at back of Cave Hill, N.W. side.
- Ocalea castanea**—Nov. One example amongst flood-refuse on bank of Lagan Canal, near Belfast.
- Ilyobates nigricollis**—June. One example from foot of Cave Hill, under stones in similar position to *Astilbus canaliculatus*, which it resembles somewhat in its movements. Have searched the same locality repeatedly since, unsuccessfully.
- *Homalota sodalis**—August. Two examples taken from a nest of *Bombus terrestris* at Culmore, Co. Derry. Verified by M. Fauvel.
- *H. xanthopus**—May. A single example, near Antrim. Verified by M. Fauvel.
- H. currax**—April. One example from Cave Hill. Have previously recorded this from the Foyle district.
- Falagria thoracica**—July. On sandhills at Magilligan. Not previously taken in Ulster.
- Autalia impressa**—} Sept. From fungi, near banks of Lagan Canal.
A. rivularis }
- Myllæna brevicornis**—August. Under pebbles on bank of small river at head of Carr's Glen, Co. Antrim.
- Leptusa fumida**—} August. Under same piece of bark of dead
Omallum vile } Sycamore tree, at foot of Carr's Glen, Co. Antrim.
- Mycetoporus angularis**—July. From moss growing on rock near summit of Collinward Hill, Co. Antrim.
- Quedius picipes**—June. Under stones in dry situations on face of Cave Hill.
- Q. fumata**—Oct. Taken by Mr. H. Booth in Colin Glen, Co. Antrim.
- Ocypus brunnilpes**—April, May, June, and Oct. Under stones near boundary wall of Shaftesbury estate, Cave Hill. Have also taken it in Colin Glen.
- Stenus canaliculatus**—May. Lagan Canal bank, near Belfast. Occurred commonly in Foyle district.
- S. melanopus**—Aug. One example on bank of Lagan Canal, near Moira, Co. Antrim.
- S. crassus**—May. Near Belfast, Co. Antrim.
- *S. melanarius**—July. Culmore, Co. Derry. Verified by M. Fauvel.
- S. binotatus**.—Extract from Journal—"March 16th, 1901. Took hundreds of *Steni* from a few tufts of grass at edge of Lagan Canal, near Belfast, including twelve species." Amongst these were several *S. binotatus*.
- Trogophloeus rivularis**—July. Foyle district, Co. Derry. Verified by M. Fauvel as *T. erichsoni*.
- T. elongatulus**.—In company with the *Steni*, taken on March 16th (see *S. binotatus*).

- Trogophlœus fuliginosus**—June. Lagan Canal, near Moira. Previously recorded by me, for first time, from Foyle district.
- Syntomlum æneum**—Dec. One example from grassy bank near foot of Cave Hill, Co. Antrim.
- Omallum læviusculum**—May. Shore of Helen's Bay, Co. Down
- Bryaxis sanguinea**—June. Banks of Lagan Canal, near Moira. Previously recorded by Haliday.
- *Subcocclnella xxiv-punctata**—June. From herbage on face of cliff between Whitehead and Blackhead, Co. Antrim.
- Corticaria denticulata**—June. By sweeping banks of Lagan Canal near Lisburn.
- C. umbilicata**—June. Abundant in dry tufts of grass at Blackhead, Co. Antrim.
- Cryptophagus setulosus**—June. Same situation as *Cort. umbilicata*. This species was taken in the Foyle district from a nest of *Bombus terrestris*.
- C. affinis**—August. Have taken this in both Co. Antrim and Co. Down, and have also one specimen from the Foyle district.
- Atomaria berolinensis**—June. In company with *Cort. umbilicata* at Blackhead, Co. Antrim; also one example from the Foyle district.
- Heterocerus flexuosus**—} Sept. and Oct. All from shore of Strang-
H. arenarius } ford Lough, between Comber and New-
H. britannicus } townards, with numerous varieties. The first two occur in company, rather below H.W. mark of O.S.T., the borings of *flexuosus*—in the situation in which I met with them—being from half inch to one inch deep, seldom more; while *arenarius* bores from not less than one inch to about two and a-half inches deep. *H. britannicus* occurs up the creek leading to Comber, rather above H.W. mark, its borings not being more than one inch deep at most. Out of the large series of these three species which were taken, not in a single instance did I find two beetles in the same burrow; but, earlier in the season, doubtless the sexes would be found in the same burrow.
- Aphodius fœtens**—July. Magilligan Point, Co. Derry; almost as plentiful as *finetarius*, from which it can readily be distinguished by its longer thorax, shorter elytra, and the last ventral segments of the abdomen, which are orange red.
- A. sordidus**—July. Two examples at Magilligan Point. Not previously recorded from Ulster.
- Magilligan seems to be an exceptionally good locality for this genus. I have taken no less than eighteen species there.
- A. pusillus**—May. Lagan Canal bank, near Lisburn. Verified by Mr. G. C. Champion. Previously recorded by Haliday.
- Malthodes flavoguttatus**—} July. By sweeping under trees at
M. pellucidus } Carr's Glen in sultry weather. *M. marginatus* also occurred here, and *M. atomus* in countless numbers.
- Donacia vulgaris**—June. Banks of Lagan, near Hammond's Bridge, near Moira. I observe that when disturbed this species drops to the water, and immediately takes to wing from the surface of the water; but, perhaps, it would only do this in bright warm weather.

- Sphæroderma cardui**—July. One example amongst Bent-grass at Magilligan Point.
- Anthicus scoticus**—Dec. Two examples, shore of L. Neagh, near Shane's Castle.
- Apion cerdo**—June. Banks of Lagan, near Moira.
- A. subulatum**—June. Near Newtownards, Co. Down; and banks of Lagan, near Lisburn.
- Otiorrhynchus blandus**—May. This occurs in abundance on Quarry Point, Helen's Bay, Co. Down. Mr. H. Booth also took it in the same locality, and I have previously met with it at the mouth of Lough Foyle, on both Co. Derry and Co. Donegal side.
- O. muscorum**.—Seems to be fairly common in this district, as well as the Foyle district.
- Tropiphorus tomentosus**—April. One example in moss on face of Cave Hill.
- Ceuthorrhynchus angulosus**—June. Taken by sweeping near Templepatrick, Co. Antrim.
- *Dryocætes villosus**—July. Two examples taken from a "felled" branch of Oak in Walworth Wood, Co. Derry.
- Neoclytus erythrocephalus**—Oct. Taken in a Belfast timber yard, and kindly given to me. This pretty Beetle, which was in splendid condition, was doubtless imported in timber. It is a native of North America, and was once previously recorded from timber "said to have been grown in Ireland."

WATER BUGS.

- Aphelocheirus æstivalis**, Fab.—Sept. Found a large number of dead dried specimens washed up on shore in Sandy Bay, Lough Neagh, Co. Antrim. This confirms the only previous record of this species in Ireland, which consisted of a single immature specimen taken at Toome, Lough Neagh.
- Cymatia Bonsdorffii**, Sahlberg—June. Occurs plentifully at the Belfast end of the Lagan Canal. I do not know of any other locality in the North of Ireland, but surely its range in Ulster can hardly be restricted to the Lagan Canal.

WOODLICE.

- Porcellio dilatatus**, Brandt.—Occurs abundantly in outhouses in Antrim Road, Belfast. I also received one example amongst the mangled remains of a number of common butterflies and beetles, kindly taken for me by a juvenile friend near Dunmurry, Co. Antrim. It is significant that *P. dilatatus* was the only Woodlouse in the bottle. Since the publication of Dr. Scharff's Monograph in 1894 this species has been taken in Surrey, and in Galway; previously it had been found only in Dublin, and had not been recorded from England. I have also taken it near Chichester, Sussex.

Our knowledge of the extent of the distribution of the woodlice in the British Isles seems to be somewhat limited, which is rather surprising, since the situations in which they mostly occur—such as outhouses, &c.—usually produce some good beetles. There seems to be an opening here for some of our coleopterists.

Anyone wishing to identify the British species of woodlice can readily recognise them from the excellent descriptions given by Dr. Scharff in a monograph published in the *Irish Naturalist* in February, 1894.

My warmest thanks are again due to Mr. J. N. Halbert, for very kindly naming and verifying a large number of beetles. Mr. G. C. Champion and M. Fauvel have also kindly verified a few of the more critical species.

Belfast.

NOTES.

BOTANY.

Mosses of Northern Ireland.

When writing the notes which appeared in this Journal, p. 10, *supra*, I inadvertently omitted to consult Rev. C. H. Waddell's interesting paper on "Mosses and Hepatics in Ulster," *Ir. Nat.*, vol. vii., p. 157. In that for *Hypnum chrysophyllum* and *H. polygamum*, Mr. Waddell gives prior records from Co. Armagh; and *H. eugyrium* is mentioned as having been found by himself and Canon Lett in Co. Louth.

Hypnum polygamum is frequent in the vicinity of Lisburn, where I have since noticed it in other localities than those previously given. One of them is clayey ground at the Bog Mills, Co. Down, apparently a new county record. It occurs there with abundant *Dicranella rufescens*.

J. H. DAVIES.

Lisburn.

A Rare Variety of Lady Fern.

I have seen a specimen of *Athyrium Filix-femina*, var. *Fieldie*, gathered in a lane near Newtowncunningham, Co. Donegal, by Miss J. Cunningham. In this curious form the pinnæ are cruciate, each dividing at the base into two divergent branches. The original form, found by a Miss Field in England, is well known to fern-lovers. I do not know of the variety having ever been obtained since.

R. LL. PRAEGER.

Dublin.

Notes on Connemara Botany.

Whilst botanizing in Connemara in the latter part of last year, I noticed the following species:—*Erophila præcox* grows sparingly on a wall in one of the streets of Clifden. Some of the plants were flowering and fruiting on the 23rd Nov., surely an early date for even this early species to bloom. Although referable to this species, the plants were untypical, being stouter and more leafy at the base than ordinary *Erophila præcox*. The very patent pedicels were also a noticeable feature. The pods were nearly as broad as long, and so agreed well with the typical plant. *Potamogeton rufescens* grows sparingly in Kylemore Lake, on the southern side. *Thalictrum collinum*.—Sparingly on the margin of a pool close to Recess Station. Within a stones-throw of this locality, I found a large solitary shrub of *Arctostaphylos Uva-ursi*, in all probability bird-sown. Luxuriant *Erodium moschatum* still grows in the "Cybele" Clifden station, and on the northern shore of Clifden Bay, I noticed well established *Senebiera didyma*. *Aspidium lobatum*.—An untypical form of this fern grows to the west of Oughterard, on rocky ground to the south of the river. *Juniperus nana*.—This plant seems particularly abundant on the Connemara mountains, and descends to a low level. It grows on the margin of Craigamore Lake, the classic locality for *Erica Mackaii*, and I found it on Urrisbeg Mountain, on Ben Lettery, etc., and saw it growing plentifully and fruiting on the summit of Derryclare Mountain, 2,220 ft. above sea level. On the 28th Nov., I found a few shrubs of *Erica mediterranea* in bloom on the western side of Urrisbeg Mountain. I believe that this is the earliest date hitherto recorded for the flowering of this species.

CECIL P. HURST.

London.

Bramble leaping an eleven-foot Wall.

Not long ago (*J.N.*, March, 1897), I noted the performance of a Bramble in producing, in a single season, shoots whose rooted tips formed a circle 50 feet in diameter. A more remarkable feat I observed near Rathfarnham lately.

A strong young Bramble (*Rubus rusticanus*) grew at the base of a stone wall 11 feet in height. Last season the plant sent upwards half a dozen strong stems, which overtopped the wall, climbed down the further side, and firmly rooted themselves in the soil—preparatory to forming new bushes next year. As the shoots did not choose the shortest course their length varied from 25 to 30 feet each. One would hardly have thought, that in the British flora we had a plant capable of crossing such a barrier by vegetative growth in a single season.

R. L.L. PRÆGER.

Dublin.

ZOOLOGY.

Eggs of *Arion hortensis*.

While Mr. H. L. Orr and I were collecting near "Sampson's Stone," Downpatrick, April 14th, 1900, we found a specimen of this Slug, one inch long, extruding eggs, of which there were nine when we left. The eggs were about 2 m.m. in diameter, almost, if not quite spherical. As we did not know at the time that eggs of this species were so very seldom found, we did not examine the eggs as carefully as we should have done otherwise. Dr. Scharff, in his "Slugs of Ireland," *Trans. R.D.S.*, ser. xi, vol. iv., p. 546, states that Simroth had some deposited by captive specimens, which were round and quite clear. The Downpatrick specimens were semi-opaque.

R. WELCH.

Belfast.

Sphinx convolvuli Breeding in Ireland.

The natural history magazines of last autumn contain many records of the capture of larvæ of the *Convolvulus* Hawk-moth in Great Britain. Ireland also came in for an immigration of this insect; and the capture of the green variety of its caterpillar at Mallow, by Mr. F. Stawell (who kindly forwarded specimen to the Dublin Museum), shows that it bred in this country. The occurrence of fresh specimens of the moth in Dublin and the suburbs suggested that the insect also bred near the city.

G. H. CARPENTER.

GEOLOGY.

Mollusca from Shell-marl, Clonbrock, Co. Galway, and Portaferry, Co. Down.

Streams and deep drains cut through beds of shell-marls, exposing good sections, near Clonbrock, and in one section near the old woods in demesne I obtained the following ten species, all of them abundant in the deposit:—*Succinea putris*, *S. elegans*, *Limnæa stagnalis*, *L. palustris*, *Physa fontinalis*, *Bythinia tentaculata*, *Valvata piscinalis*, *V. cristata*, *Sphærium corneum*, and *Pisidium pusillum*. In the Ards peninsula, Co. Down, there are several such deposits. One I examined at Ballyfinragh Lough, three miles N.E. of Portaferry, is more calcareous than those I saw in Galway; the shells are more numerous, but there are fewer species present, and they are much smaller. Mr. R. A. Russell kindly sent me some pounds of this, in which, and in a smaller quantity I brought away some years ago, I found *Limnæa peregra*, *Valvata piscinalis*, *V. cristata*, *Planorbis crista* (rare); *Sphærium corneum*, and *Pisidium pusillum*. In addition to these Mr. A. S. Kennard, of Beckenham, to whom I sent some of the material, found one specimen of *Acme lineata*, a rare shell in any old deposit, and usually so where it occurs alive, even now. Remains of the Irish Elk have been also recorded from Ballyfinragh.

R. WELCH.

Belfast.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Chacma Baboon from Mr. Crawford Donnelly, a Badger from Mr. W. R. Fetherstonhaugh, and a Golden Eagle from Mr. Watson. A Racoon and a pair of Ibexes have been bought.

DUBLIN MICROSCOPICAL CLUB.

DECEMBER 11.—The Club met at Leinster House.

Mr. F. M. SELLENS exhibited a living specimen of *Daphnia hyalina* obtained from a pond at Sutton, Co. Dublin. There are two peculiarities which mark it out from some of the other forms. These are the tall helmeted head, which closely approaches, or may even exceed, one-third of the entire body-length, and the long shell-spine. The terminal claws on the tail are smooth, whereas in some of the other species these claws are furnished with lateral spines arranged side by side like comb-teeth.

JANUARY 8.—The Club met at Leinster House.

Mr. MOORE showed hairs from the calyx of *Steriphoma paradoxa*. The buds of this plant appear to be of a bright orange-red colour, which is due to the presence of crowded compound stellate hairs which cover the calyx thickly, especially the lower portion, and which contain brightly-coloured sap. The walls also seemed to be stained inside. They formed a very pretty object when examined under the microscope.

Mr. M'ARDLE exhibited a specimen of the rare *Cephalozia Francisci*, Hook., which was collected by himself and the Rev. Canon Lett, at Pontoon, on the rocky shore of Lough Conn, Co. Mayo, in May last. He also showed a figure of the plant by Mr. W. N. Allen, which was drawn from specimens collected on the Hill of Howth in 1893, and is included in Mr. M'Ardle's paper on the "Hepaticæ of the Hill of Howth," *Proc. R.I.A.* (2), vol. iii. The other localities known in Ireland are near Bantry, Co. Cork, together with *J. Turneri*. Miss Hutchins sent it to Sir Wm. Hooker about the year 1811, who records it in his work on the British *Jungermanniæ*, at tab. 49. Found also at Kinnahalla, in the Mourne Mountains, Co. Down, in fruit, by Rev. Canon Lett, June, 1883. Found in England and Scotland; and on the Continent, sparingly.

Dr. SCHARFF exhibited an exceedingly minute species of gastropod marine shell (*Adeorbis unisulcatus*) dredged off Ballycastle, Co. Antrim. The species was described as new to science, and figured by Dr. Chaster (*Journ. of Conchology*, vol. viii., 1895-1897, p. 373), who had also sent a note about it to the *Irish Naturalist* (vol. vi., p. 125). It differs from *A. imper-spiciuus* by its smaller size, and especially by the remarkably deep spiral groove on the underside of the shell. Dr. Chaster has since found the same species on the west coast of Scotland, at Plymouth, and at Tangier.

Mr. G. H. CARPENTER showed the specimens of puparia of the Grouse-fly (*Ornithomyia avicularia*) which he described and figured in the *Irish Naturalist*, November, 1901.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

JANUARY 6.—A meeting was held in the Museum, when a lecture was given by Joseph Barcroft, M.A., B.Sc., on the subject "Respiration."

BELFAST NATURALISTS' FIELD CLUB.

DECEMBER 11.—Mr. J. VINYCOMB in the chair. Mr. WILLIAM GRAY submitted his report, as delegate from the Club, to the Glasgow meeting of the British Association, and explained the objects and methods of work of the Association, in view of the forthcoming meeting in Belfast. A series of lantern views, illustrating the Glasgow meeting and excursions, were shown by Messrs. Fennell, Phillips, and the speaker.

DECEMBER 17.—Mr. WM. GRAY in the chair. Mr. F. C. FORTH, Principal of the Technical Institute, delivered an address on "How can the Municipal Technical Institute aid the progress of Natural Science?" The paper was discussed by Messrs. C. M. Cunningham, R. Welch, Adam Speers, B.Sc., A. Milligan, R. May, John Hamilton, St. J. Phillips, and the chairman.

Before the meeting a number of members assembled for the usual half-hour "science gossip." Mr. Cunningham exhibited an abnormality in the dentition in a skull brought from the Seychelles Islands, while other members exhibited objects of interest.

DECEMBER 26.—The usual informal mid-winter excursion was held, the locality selected being Dundrum. A party of fourteen turned out, and an instructive day was spent. The great Anglo-Norman castle was visited, and some hours devoted to the extensive sand-dunes, the best finds being a good hollow scraper of flint, and specimens of the rare Thistle, *Carlina vulgaris*, were collected by Mr. Praeger, being the third station in the county. Some observations made on the shore by Mr. Welch will be published subsequently.

CORK NATURALISTS' FIELD CLUB.

NOVEMBER 19.—A lecture was delivered by George H. Pethybridge, Ph.D., B.Sc., on "Plant Habits and Habitats." There was a large attendance. The lecturer spoke at length of the different forms plants took when growing, and suggested, from personal experiments, some probable cause. He also pointed out the influence of environment on plants, showing how the same plant assumes a totally different form according as its environment changes or is changed. Dr. Pethybridge spoke of the rivalry among plants, and gave examples of some cases where a plant spread and ousted nearly all others from a neighbourhood. The lecture was illustrated by numerous lantern slides. After a vote of thanks to the lecturer, the proceedings terminated.

DUBLIN NATURALISTS' FIELD CLUB.

DECEMBER 10.—MR. F. W. BURBIDGE in the chair. MR. R. H. NELSON read a paper on "Fossils and Fossilization," illustrating his remarks by means of specimens and casts.

MR. R. J. USSHER then gave a paper on "The Breeding-habits and Architecture of Birds." The peculiarities of the eggs and young of all birds are suited to the parents' mode of disposing of them, and afford a considerable clue to classification on a natural basis. The number of eggs laid by birds of different groups varies greatly. Petrels, and most of the Auks, lay but one; Nightjars, Pigeons, and Divers, have two only; Gulls and Terns, usually three; Plovers and Sandpipers, four; Passeres usually have four to six, though Goldcrests and Tits lay up to ten; gallinaceous birds, Ducks, and Rails, from eight to twelve eggs. The shape too, is characteristic. Eggs of Owls and Falcons, and, indeed, of most raptorial birds, are rounded; eggs of Nightjars, Pigeons, Grebes, and Petrels, incline to be equally rounded or pointed at both ends; those of Plovers and Sandpipers are pear-shaped; those of Guillemots are drawn out to a long point; while the eggs of Divers are elongated, but not pointed.

Then, as to colour, the eggs of the Thrush and Crow families are blue-green, speckled or stained with brown or black; those of Tits are white, speckled with rufous; those of Buntings are streaked; the eggs of Woodpeckers and Kingfishers are glossy white; of Owls white, but wanting polish; those of Falcons have reddish-brown markings, which usually cover them; Rails have buff-coloured eggs, speckled with red or purple; Ducks and Geese lay spotted eggs of a buffish or greenish white; Cormorants' and Grebes' eggs are covered with a rough white, chalky coating; those of Gulls are olive, with brown or grey spots; Auks' eggs vary wonderfully in colouring and markings; and those of Petrels are white, minutely speckled with a zone of brown. White eggs are generally laid in covered nests, or in holes; as are those of Barn Owl, Dipper, Swift, Kingfisher, Rock Dove, Sheldrake, Puffin, and Petrels.

Eggs placed openly on the ground are protectively coloured so as to resemble surrounding objects. Instances of this are afforded by the eggs of the ringed Plover and Lesser Tern, which so closely resemble the pebbles that surround them on the sea beach that one may tread on these eggs before recognising them.

The state of the young when hatched differs remarkably, as between different orders of birds; thus, the young of *Passeres*, of most of the *Picaria*, and of the *Steganopodes*, are blind, naked, and helpless, and are fed by their parents. Such young birds are hatched in comfortable nests, in which they remain until they are fledged.

The condition of the young in these birds contrasts with what obtains among *Anseres*, *Gallina*, *Fulicaria*, and *Limicola*, whose young can—almost at once—run or swim, and feed themselves; and are covered with down protectively coloured, which makes them resemble when they squat lumps of moss or peat.

The young of birds of prey are covered with warm down, which protects them in the absence of comfortable nests; but they are not protectively coloured, and being at first blind and helpless are fed by their parents—and this is done for a long time—until they can take their own prey.

The attachment of individual birds to the same or a neighbouring site, where they nest year after year is well established. Thus, the House Martin re-occupies its mud-built structure under the eaves. A Water-Hen's nest is known to have been annually built for twenty years in a branch of a Scotch fir hanging over the lake at Cappagh; and the occupation of the Martin's breeding-place year after year has been repeatedly recorded, though one or other of the birds has been shot again and again.

Of birds that build in branches may be mentioned the Golden-crested Wren and the Finches; nests are placed on tall trees by Crows, Sparrow-Hawks, and Herons; Swallows, Starlings, and Jackdaws, build in roofs and chimneys; Sand Martins, Kingfishers, and Puffins in burrows; Larks, Snipes, and Ducks, among herbage on the ground; the Nightjar lays on the bare ground eggs that resemble quartz pebbles; Ringed Plovers and Lesser Terns lay among shingle or sticks; the Harrier, Curlew, and Golden Plover, breed on the lonely expanse of moors or mountains; Lapwings, Black-headed Gulls, Coots, and Grebes, nest in bogs, marshes, and reed-beds; inaccessible cliffs are the strongholds of Ravens, Peregrines, Gulls, and Auks; while Choughs and Rock Doves resort to the dark recesses of caves opening on the sea.

Of domed nests, the eggs in which are covered by a bower or roof, may be cited those of the Chiff-chaff, Wren, Long-tailed Tit, and Dipper. The last resembles a mossy boulder or mass of waste material on the river bank. Our only pendent nest is that of the Golden-crested Wren, which is hung among the tassels of a yew or spruce bough. The Reed Warbler weaves a rocking nest between the reed-stems, which bend with it in high winds almost to the water's edge. A fortified nest is framed by the Magpie, which provides a covering of thorny twigs that tear the hands of the bird-nester who assails it.

The breeding colonies of Guillemots deserve special description. These are on bare rocks, like the summit of Doonmore, Rathlin, or the shelves of lofty cliffs, like those wonderful cliffs of Moher—which sustain their teeming bird-population up to 500 feet from the sea. Guillemots breed in packs, sitting at times close together, each on her single egg without any nest. The egg of this bird is so shaped that it tends to roll in a circle, and this must often save it from rolling off the rock. The remarkable diversity of pattern and colouring in Guillemots eggs must, in my opinion, aid each bird to distinguish her egg from those of her neighbours; and where there is a dense throng the eggs must be often moved, so that identification would not be so easy as in the case of birds which have nests, were it not that each Guillemot has her own pattern of egg.

Fifty lantern slides were exhibited, illustrating the various types of nests *in situ*, and included colonies of Kittiwake Gulls, Gannets and Guillemots. A collection of nests presented by the lecturer to the Science and Art Museum was also exhibited, by permission.

The chairman, Mr. BURBIDGE, mentioned a heronry in Co. Wicklow, the owner of which had informed him that a Heron, after laying a second clutch of eggs, was accompanied while hatching them by her young of the first brood, which sat beside her on the nest.

The Rev. J. E. B. ELLISON mentioned the Ring Dove as an exception to the rule, that birds which lay white eggs place them in covered nests. He described a Dipper's nest he had seen, which was constructed on the top of a post driven into the bed of a stream, and which stood in the eye of a bridge as an upright for paling. Mr. Ellison also stated that where patches of shells occurred on the strand in a suitable locality, he knew from experience that the eggs of the Lesser Tern were to be expected.

Mr. BURBIDGE exhibited :—1. A hardy orange tree—two branches with fruit of *Citrus trifolius*, a deciduous species from the north of China and Japan. The yellow fruits are downy outside, and the size of large apricots.

2. A hybrid groundsel from Cork, resulting spontaneously from *Senecio squalidus*, a species introduced from Greece, and our native *S. vulgaris*. It resembles the common groundsel in habit of growth, but its flowers are larger, being furnished with ray florets.

3. A vegetable parasite, *Cuscuta reflexa*, growing on ivy, and bearing clusters of small white and fragrant flowers along its wiry twining stems.

Mrs. Maconchy, Miss L. S. French, Mr. F. O'B. Ellison, and Mr. J. A. Thunder, were elected members of the Club, and two nominations for membership were received.

JANUARY 14.—ANNUAL MEETING.—The PRESIDENT (G. PIM, M.A.) in the chair. The Annual Report was submitted, from which it appeared that at the beginning of the year the Club membership reached a total of 170; on the 1st January, 1902, the number was 152, 24 new members having been elected, and 42 removed from the list. Of these latter the Committee regret to have to record the deaths during the past year of Mrs. C. M. B. STOKER, Prof. G. F. FITZGERALD, and Mr. THOMAS GREENE, the first two of whom were members of the Club since its foundation. The average attendance at the Winter Business Meetings, seven in number, was about 35. The Irish Field Club Union held its third Triennial Conference in Dublin, from June 18th–22nd, which was fairly well attended. Under the auspices of the Field Club Union, Mr. Seymour lectured at Belfast in February, and Dr. Pethybridge at Limerick and Cork in November.

The Winter Session opened on November 5th with a *Conversazione*, which was attended by 140 members and visitors, including representatives of the Belfast Field Club.

With the exception of the last, all the six excursions arranged for were carried out, the attendance being much better than last year. The Fungus foray to Woodenbridge had to be abandoned, no mycological member of the Club being available to act as Conductor. There were only four competitors for the Club prizes this year, but the collections sent in were of greater merit than previously. The prizes were awarded as follows:—Flowering plants, Miss Dorothy Hudman; Freshwater and Marine Mollusca, Miss Massy; Pleistocene fossils, J. de W. Hinch.

The proceedings at both the Summer and Winter meetings of the Club continue to be reported in the pages of the *Irish Naturalist*, and the Committee would again urge on members the desirability of supporting this Irish Natural History magazine, by subscribing to it regularly. The Committee recommend that a grant of £3 3s. be made towards defraying the expenses of its publication during 1901.

The best thanks of the Committee are tendered to the Council of the Royal Irish Academy, for again granting the Club the privilege of meeting in their house during the year.

The Treasurer's statement showed a balance in hands of £8 os. 6d., almost exactly the same as last year. The report and statement of accounts were adopted. The Officers and Committee were declared elected as follows:—

President, W. F. de V. Kane, M.A., D.L.; Vice-President, F. W. Burbidge, M.A., F.L.S.; Hon. Secretaries, Henry J. Seymour, B.A., F.G.S., W. B. Wright, B.A.; Hon. Treasurer, H. K. Gore Cuthbert; Committee, G. H. Carpenter, B.Sc., A. H. Foord, Ph.D., F.G.S., J. N. Halbert, Miss Hensman, J. de W. Hinch, D. M'Ardle, Miss M'Intosh, B.A., Miss R. Mahaffy, Miss A. L. Massy, G. H. Pethybridge, Ph.D., B.Sc., Greenwood Pim, M.A., R. Ll. Praeger, B.A., B.E.

The incoming President having taken the chair, votes of thanks were passed to the outgoing officers, the Royal Irish Academy, and the Press. The President then delivered an inaugural address, which will appear in full in our pages. A vote of thanks to the President concluded the proceedings.

Mr. Willoughby Dade and Mr. C. Dowling were duly elected into the Club, and two new candidates were proposed.

NEWS GLEANINGS.

“Irish Song Birds.”

We are glad to see the announcement, by Messrs. Hodges and Figgis, of a new edition of the Rev. Dr. Benson's well known book on “Our Irish Song Birds.” The information contained in the works of Messrs. Barrington and Ussher has been made use of in the preparation of this new issue.

RECENT PROGRESS IN IRISH NATURAL HISTORY

BY W. F. DE V. KANE, M.A., D.L.

(Presidential Address to the Dublin Naturalists' Field Club,
January 14, 1902.)

IN addressing you this evening as President of the Club, I desire in the first place to thank you for the honour you have paid me. It is always a great gratification to me to take part in your meetings from time to time, and to find that an old member is still welcome; and the kind, but I think injudicious, compliment you have now paid me proves that you reciprocate my feelings not wisely but too well.

When I look back a few years and remember the scant interest shown generally throughout Ireland in Natural History pursuits, I feel that a great advance has been made since the founding of this Society to popularise these studies; and though we have much lee-way to make up, I feel confident that Irish genius will assert itself ere long in this branch of science, and that numerous adepts will carry on the labours of Praeger, Colgan, Barrett-Hamilton, Ussher, and other well-known names in "fresh woods and pastures new."

We have, however, to regret the loss of Professor Haddon, who was so largely instrumental in founding this Club, and whose zoological enthusiasm infected all with whom he came into contact. We wish him a very successful and distinguished career in his new sphere of work, as well as Dr. Patten, whose appointment to the Chair of Anatomy at Sheffield deprives us of one of our most promising members. We cannot but deplore the drain of so many of our talented young men to the sister island, which offers so much better careers than are available at home. Though, doubtless, we reap many great advantages from its proximity, yet the thought often arises that the flourishing country so close to us acts as the fabled Magnetic Rock island, which drew out the iron fastenings of any ship which too nearly approached, and left its timbers disunited, and incapable of weathering a storm. *Absit omen!* Several noteworthy and valuable papers have appeared in the pages of the *Irish Naturalist* for 1901, such as Dr. Patten's

well written notice of the Grey Phalarope, Miss Delap's notes on the life-history of the Jelly-fish *Chrysaora isosceles*, Messrs. Alcock and Moffat's description of the habits of the Long-eared Bat; papers which I hope are the forerunners of a long series of similar contributions from their own and other pens. They are examples of thorough work, and illustrate to the members of our association the importance of taking up seriously and studying carefully some one line at least of particular research. No matter how small a field may be chosen, whether of mere collecting, or simple observation of habits, experts in every branch of Natural History feel the need of more assistance in this respect. The discoveries of science are founded upon a careful comparison of accumulated facts, and Clubs, such as ours, have their primary function in amassing materials of this kind. And an insular fauna and flora, such as that of Ireland, presents scientific problems of the highest import; its very poverty being pregnant with meaning, while at the same time its occasional richness in unexpected directions, is a revelation of past geological or climatic vicissitudes. Let every hand, therefore, try to pile a stone on the cairn of knowledge, and commence this year by systematic work.

Much has been done in the past at the botany of Ireland; much at geology, a good deal in conchological research, but in entomology there still remain branches almost unworked. The Micro-Lepidoptera, or section of small moths, have been strangely neglected. And their collection is not fatiguing or difficult, and can be pursued in daylight. Nor are large and expensive cabinets requisite for storage of specimens. Their beauty, too, equals, nay exceeds, that of their larger relatives. How suitable a field for the fair sex, who in the neat setting of their treasures would triumph beyond all masculine competition! Other orders also require attention, notably the Hymenoptera and Diptera, no important collection of the latter having been made in Ireland since Alexander Haliday's time. One group is now engaging the attention of Dr. Mittall of Cambridge, who asks for help in the investigation of Mosquitos in connection with his researches on malaria. Two (or perhaps three) species of *Anopheles* have been found in Ireland and he asks for assistance in discovering fresh Irish localities.

May I also press the claims of Entomostraca, those beautiful minute Crustacea which abound in all our still waters, and of which little is known yet? I hope shortly to put on record my own three years' investigations, which have been amply and richly rewarded. I believe that in no part of the United Kingdom has so long and interesting a list been compiled in the time. I need not say that any experience I have so far acquired will be heartily at the service of any fresh students of the group.

In reviewing the additions to our knowledge made during the last twelve months, the first event in importance is the publication of Mr. Praeger's work, "Irish Topographical Botany." Who could have thought it possible that the valuable second edition of "*Cybele Hibernica*" could have been so soon supplemented by such a mass of additional material? Truly only a modern Manannan Mor MacLir (the giant Goblin who was said to stride around Ireland in twenty-four hours), could so swiftly traverse the country, and sample its productions. Some important botanical finds might be referred to, but as a summary by Mr. Praeger has been recently read before the Club, it is unnecessary. The only remark that I would venture to make is, that the discovery of *Sisyrhynchium angustifolium* on the shores of Lough Erne suggests a difficulty that if its indigenous distribution has been so wide, how is it that its existence in Cork, Kerry, Galway, and Fermanagh has been so long overlooked? The seeds have a remarkable vitality, and the plant spreads rapidly. Is it possible that they may have been carried down by floods and deposited on the shores?

Of Lepidoptera we have some remarkable captures by Captain Donovan, who, returning from foreign service to his home in Co. Cork, devoted his leave to his old pursuit, adding numerous remarkable captures to his earlier records. The occurrence of a single specimen at Timoleague, Co. Cork, of *Cucullia absinthii*, which is both rare and local in England, reported by his brother in 1900, has been followed by the capture of another imago, and numerous larvæ, which proves its indigenous origin. On the other hand, his find of *Cuccullea verbasci* in the larval and perfect state points to a successful immigration, for its very conspicuous caterpillar, seen in some

numbers in 1901, could not have hitherto escaped the notice of these two keen entomologists during so many years of careful investigation in that locality. Several breeding-places of the rare and local *Nonagria sparganii* have also been discovered in swamps of the district between Old Head of Kinsale and Glandore, and this adds a very important item to our Fen Lepidoptera, and furnishes a most reliable proof of the arrival of part of our fauna by means of a former connexion with France. One, *Leucania vitellina*, which is a casual visitor to the south coast of England, has also been captured near Courtmacsherry, Cork—a very remarkable capture. The past as well as the preceding year has witnessed a great extension of the area of habitat of the Peacock butterfly, it having again appeared in good numbers all over the north of Ireland. It is generally common in the south and west. Observers should watch to see if these beautiful colonists make good a permanent settlement north of Dublin. Another extremely good find is *Agrotis cinerea*, by Mr. Greer, at Tullylagan, Co. Tyrone. This is another addition to our Irish Lepidoptera.

Ornithologists have been active, as usual, adding many observations as to habits, and noting several rare visitants. The Redbreasted Pipit is new to Ireland. A large flock of Mealy Redpoles visited Achill in October, of which many specimens were secured, and proved to be the Greenland form, var. *rostrata*. One also occurred at Inistrahull lighthouse, off the coast of Donegal. Of American visitants we have a record of a Pectoral Sandpiper shot by Dr. Leeper in the same Belmullet locality as the one obtained in October in the previous year; and an American Bittern from the wild regions of the Hudson's Bay territory has been got in Co. Waterford. Mr. Williams contributes a Wood Sandpiper from Baldoyle, August 19th, the first obtained in Co. Dublin, and the sixth in Ireland.

From the sea-coast we hear of a specimen of Risso's Dolphin thrown ashore near Galway, and of the capture of the rare and handsome fish, the Long-finned Tunny, *Luvarus imperialis*, on the coast of Cork, both new to Ireland. And lastly, but not the least important from a scientific standpoint as an indication of the origin of our island fauna, we have Mr. Farran's discovery of the crustacean Amphipod, *Niphargus*

kochianus, in the wells about Dublin. Country members congratulate their city friends, and trust it may not be exterminated. Dr. Scharff has also taken an Isopod new to the British Islands, *Armadillidium pulchellum*, and by further researches has satisfied himself that the land planarian worm *Rhynchodemus scharffii* may now be confidently reckoned an indigenous native of Ireland.

And now, perhaps, I may ask your patience when I refer to one or two results of my own studies in regard to our freshwater crustacea. In 1861 Professor Lovén startled the scientific world by announcing that in the two great Swedish lakes, Wetter and Wener, he had taken five species of crustacea which were to all intents and purposes identical with marine species. One of these was a *Mysis*—a freshwater “shrimp.” The *Mysis* is an interesting genus, for zoologists know that in the life-history of the crustacea, the immature animals go through a series of transformation stages after emerging from the egg, and one of these is called the Mysis stage. That is to say, that the young Penæus, for instance, in its transformations develops into forms which have adult representatives, the last of which is the Mysis, and then finally changes to the Penæus. The genus *Mysis* does not undergo any further change, but passes its adult life at that stage. From this and numerous other similar phenomena a dictum of the theory of evolution has arisen; namely, that the life-history of the individual recapitulates the history of the development of the race. Hence we infer that the *Mysis*, the Lobster, the Penæus, and so on, are highly developed forms that originated from a common and simpler organised ancestor.

Mysis oculata is a marine species which frequents the Arctic seas from Spitzbergen to Labrador. It is scarcely distinguishable from Professor Lovén’s freshwater *Mysis relicta*. And since in these two Swedish lakes there are four other freshwater crustacea also closely similar to sea-dwelling species, it has been thought that probably all five were introduced into these great inland basins by a submergence of land during the Glacial period, and were captured as it were by the upper movement which followed subsequently.

But latterly some have hesitated to accept this hypothesis, not only geologists who dispute the submersion of certain

territories indicated, but by zoologists who are examining the distributional phenomena. Two of them, for instance, *Mysis relicta* and *Pontoporeia affinis*, have also been found in Lakes Superior and Michigan. The former, which I have taken in Lough Neagh and Lough Erne, which is its most southern station, occurs in ten Scandinavian lakes, several in Finland and Russia, and a few in North Germany and Schleswig. Now, if so many ages ago a marine animal was isolated from its marine surroundings, and introduced separately in isolated inland freshwater basins differing from each other in depth and extent, climatic conditions, and probably food supply, how comes it that the various vicissitudes have not developed in each case some adaptive changes in the organism? But we find that *M. relicta* is very uniform in its features, and only in a few cases offers trivial differences over so wide an area of distribution. If we consider the vast size of Lakes Ontario and Michigan, whose waters stretch for hundreds of miles, Lake Onega, also, of about 150 miles in length, and of great profundity, their winter temperature, too, and those of the Finnish Lakes, and compare these conditions with those of our lakes of Erne and Neagh, whose extreme soundings are 200 feet and 100 feet respectively, but with the greater areas of both comparatively shallow, and their temperate climate, the zoologist is almost forced to conclude that this freshwater species has been accustomed to this medium for ages previous to the Glacial epoch. The modification from the marine animal when introduced to fresh water would, of course, be due to a specific form of environment; but apart from the consideration that nature seems always to find more than one way out of any difficulty, the changes in this case would be complicated by the local peculiarities above adverted to. And with regard to the testimony of geology, authorities seem unanimous in stating that insurmountable difficulties oppose any theory of post-Glacial submergence, which would have admitted the sea into the chain of American lakes above the Falls of Niagara. The lower portion of Lake Ontario admittedly has a deposit containing sea shells of comparatively recent geological date, but only the lower portion. How then did *Mysis relicta* become introduced into our two great Irish lakes? They present little difficulties in regard to the submergence theory, but is

there any other hypothesis which would bring them into line with other *Mysis* habitats?

For if we are forced to conclude our *Mysis* to be an extremely ancient inhabitant of fresh water, in spite of its close resemblance to *M. oculata*, we must provide a theory for its introduction with our other fresh-water fauna, overland from lake to lake by some Continental land connection. Let us see, therefore, what evidence is afforded by the other contents of these lakes. Firstly, we are struck by the fact that the Pollan, or "Fresh-water Herring," inhabits both Loughs Erne and Neagh. The genus *Coregonus*, or "Charr," to which this species belongs, is characterised as a group by its alpine habitats. Various species are known to inhabit lakes in the North of Ireland and Great Britain, Scandinavia, North Germany, Finland and Russia, as well as North America. We may therefore infer that part of the fauna of Loughs Neagh and Erne came from northern latitudes, or at least from alpine regions. Now, in my examinations of Lough Erne I happened upon a minute crustacean, slides of which have been exhibited under the microscope to this Club, which was identified by Professor Lilljeborg, of Upsala, as *Bosmina mixta* v. *humilis*, and is new to the British Islands, and another closely allied, *Bosmina coregoni*. The former, so far as is known, only occurs in Scandinavia, and the Alps of Central Europe. I took it myself this year in a lake in the Bavarian highlands. The latter has one Scotch habitat, Loch Maben, where also is a species of *Coregonus* or Charr, the Vendace, also confined to that Dumfriesshire lake and the neighbouring waters, whose chief food is said to consist of *Bosmina coregoni*.

Here, again, we have an indication that some of the organisms of Lough Erne may have passed over to us from Scotland before Ireland was insulated from it. Further, I found another species of Entomostracan of a much larger size inhabiting the open waters of the lake, which has not yet been detected in any British waters; though an allied species is known in Irish waters, certain lakes of Scotland and the north of England, as well as Central Europe. Its name is *Bythotrephes cederstroemi*, and it appears to be subarctic in its European distribution, not yet having been recorded from Germany. Here, then, we have three fresh-water Scandinavian

crustacea, one of which is also found in Scotland; and together with these certain species of an alpine genus of fish, with its headquarters in Scandinavia and high altitudes. Though the science of geology does not yet speak with certain voice upon some more or less local movements of the earth in past ages, yet its testimony is very distinct as to the former continuity of Scandinavia, Scotland, and the North of Ireland, which for a long period subsequent to the Glacial epoch formed a continuous peninsula. As to the purely fresh-water fauna of Ireland, therefore, there can be no difficulty in assigning (at least to a great portion of it) a European origin through Scandinavia. Therefore, if the marine hypothesis of the introduction of *Mysis relicta* to our two greatest lakes has to be abandoned, its association with Scandinavian Entomostraca offers a very simple explanation of whence it was derived. If you ask me, however, *how* the introduction was effected of these fresh-water organisms, and *how* they were conveyed from lake to lake, I can only reply that though some light can be thrown upon it, yet the phenomenon (especially with regard to the introduction of fish, and particularly the delicately-organised *Salmonidæ*, to which the various species of Charr belong), is one of the most inexplicable of all distributional problems. As, however, it is one of such wide comprehension, we need not be staggered by any single example. The difficulty sinks into comparative insignificance if we remember the extraordinary apparition of *Artemia salina* in any locality in which brine ponds are established, when the water becomes sufficiently salt to fulfil the requirements of its existence.

In any case, however, the enormous tracts of time which are involved in the problem of the influx of fresh-water animals hither from North Europe, and also of our newly-found American fresh-water sponges, stagger the mind with their immensity! How noble a study then is that of Natural History; opening ever afresh new vistas of an interminable past, full of wondrous energies; and raising our minds from horizon to horizon, shining with the life-giving rays which emanate from the great Source of all Light and Life!

Drumreaskie, Monaghan.

COLEOPTERA FROM BALLYCASTLE, CO. ANTRIM.

BY GEORGE W. CHASTER, M.R.C.S., AND BROCKTON TOMLIN.

THE beetles recorded in the following list were all taken in the neighbourhood of Ballycastle, Co. Antrim, during a visit of rather more than a week at the beginning of September last. Six species occurred which are new to the Irish fauna, viz.:—*Gyrophæna gentilis*, Er.; *Leptusa analis*, Gyll.; *Philonthus scutatus*, Er.; *Stenus exiguus*, Er.; *Agathidium convexum*, Sharp; *Cyphon punctipennis*, Sharp, and three species of which only a single specimen had been previously recorded, viz.:—*Gyrophæna minima*, Er., *Saprinus quadristriatus*, Hoff., and *Rhizophagus parallelocollis*, Er. The time of year was too late for a rich haul of *Carabidæ*, such as occurred on Rathlin Island in May, 1897. We had one day on the island, but only added *Stenus brunnipes* and *Tachyporus obtusus*, var. *nitidicollis*, to Mr. Hardy's list in the *Irish Naturalist* of July, 1897.

The list is as follows:—

CARABIDÆ.

Cychnus rostratus, L.—Rathlin Island. *Carabus catenulatus*, Scop.—Summit of Knocklayd. *C. granulatus*, L. *Notiophilus biguttatus*, F.—Ballycastle. *N. substriatus*, Wat.—Ballycastle. *N. aquaticus*, L. *Leistus spinibarbis*, F.—Near Kenbane Head. *L. fulvibarbis*, Dej.—Generally distributed. *L. rufescens*, F.—Ballycastle. *Nebria brevicollis*, F. *N. Gyllenhali*, Sch.—Knocklayd. *Loricera pilicornis*, F.—Ballycastle. *Clivina fossor*, L. *Dyschirius globosus*, Herbst.—Gortconny Bog, near Ballintoy. *Badister bipustulatus*, F.—Whitepark Bay, some of the specimens being unusually dark. *Harpalus puncticollis*, Payk. *H. latus*, var. *erythrocephalus*. *Pterostichus madidus*, F. *P. oblongo-punctatus*, F.—Fairly common under stones in woods, Murlough Bay. *P. niger*, Schall. *P. vulgaris*, L. *P. nigrita*, F. *P. strenuus*, Panz. *P. diligens*, Sturm. *P. striola*, F. *Amara spinipes*, Auct.—By evening sweeping, Ballycastle. *A. plebeia*, Gyll. *Calathus cisteloides*, Panz.—Ballycastle. *C. mollis*, Marsh. *C. melanocephalus*, L.—Not common; the var. *nubigena*, Hal., was taken in Whitepark Bay. *C. piceus*, Marsh. *Taphria nivalis*, Panz. *Anchomenus angusticollis*, F. *A. dorsalis*, Müll. *A. parumpunctatus*, F. *A. gracilis*, Gyll.—Bushfoot. *Bembidium rufescens*, Guér. *B. quinquestriatum*, Gyll. *B. mannerheimi*, Sahl. *B. lampros*, Herbst. *B. littorale*, Ol. *Trechus minutus*, F., and var. *obtusum*, Er. *Dromius linearis*, Ol. *D. nigriventris*, Thoms.—Ballycastle sandhills.

HALIPLIDÆ.

Haliplus ruficollis, De G. *H. lineatocollis*, Marsh.

DYTISCIDÆ.

Laccophilus obscurus, Panz. *Cœlambus inæqualis*, F. *Hydroporus palustris*, L. *H. erythrocephalus*, L. *H. obscurus*, Sturm. *H. nigrita*, F. *H. discretus*, Fairm. *H. Gyllenhali*, Schiod. *H. pubescens*, Gyll. *Agabus Sturmii*, Gyll. *A. bipustulatus*, L. *Dytiscus punctulatus*, F.

GYRINIDÆ.

Gyrinus minutus, F.—Abundant in bog pool near Kenbane Head. *G. natator*, Scop.

HYDROPHILIDÆ.

Hydrobius fuscipes, L. *Anacæna globulus*, Payk. *A. limbata*, F. *Philhydrus melanocephalus*, Ol. *Linnebius truncatellus*, Thoms. *Chætarthria seminulum*, Herbst.—Gortconny Rog, near Ballintoy. *Helophorus brevipalpis*, Bedel. *H. æncipennis*, Thoms. *Hydræna riparia*, Kug. *Cercyon depressus*, Steph. *C. hæmorrhoidalis*, Herbst. *C. obsoletus*, Gyll.—Ballycastle shore. *C. quisquilius*, L. *C. analis*, Payk. *C. flavipes*, F. *Megasternum botetophagum*, Marsh. *Cryptopleurum atomarium*, F.—Whitepark Bay.

STAPHYLINIDÆ.

Aleochara fuscipes, F. *A. lanuginosa*, Grav. *A. succicola*, Thoms.—Common in fungi, Murlough Bay. *A. nitida*, Grav. *A. obscurælla*, Er. *Oxyroda opaca*, Grav. *O. alternans*, Grav. *Ocalca castanea*, Er. *Astilbus canaliculatus*, F. *Homalota volans*, Scrib. *H. circellaris*, Grav. *H. analis*, Grav. *H. trinotata*, Kr. *H. nigra*, Kr. *Falagria thoracica*, Curt.—Ballymoney. *Autalia impressa*, Ol. *Encephalus complicans*, Westw. *Gyrophæna gentilis*, Er.—Abundant in fungi, Hanging Wood, Ballycastle. New to the Irish fauna. *G. minima*, Er., and *G. lavipennis*, Kr.—With the preceding. *Leptusa analis*, Gyll.—Under bark, Murlough Bay. New to the Irish fauna. *Bolitochara obliqua*, Er.—In fungi, Murlough Bay. *Hypocyrtus læviusculus*, Mann. *Conosoma pubescens*, Grav. *C. lividum*, Er. *Tachyporus obtusus*, L., and var. *nitidicollis*, Steph. *T. solutus*, Er. *T. chrysomelinus*, L. *T. humerosus*, Er. *T. hypnorum*, F. *Tachinus humeralis*, Grav. *T. rufipes*, L. *T. marginellus*, F. *Bolitobius lunulatus*, L. *B. trino*, tatus, Er. *B. pygmeus*, F. *Quedius mesomelinus*, Marsh. *Q. puncticollis*, Thoms.—Ballycastle and Murlough Bay. *Q. cruentus*, var. *virens*. *Q. cinctus*, Payk. *Q. fuliginosus*, Grav. *Q. molochinus*, Grav. *Q. maurorufus*, Grav. *Q. umbrinus*, Er. *Q. rufipes*, Grav. *Q. attenuatus*, Gyll. *Q. semicæneus*, Steph. *Staphylinus erythropterus*, L.—Near Aultdreen Bridge. *Ocyptus olens*, Müll. *O. cupreus*, Rossi. *O. morio*, Grav. *Philonthus intermedius*, Boisd. *P. laminatus*, Creutz. *P. æneus*, Rossi. *P. proximus*, Kr. *P. carbonarius*, Gyll. *P. decorus*, Grav. *P. politus*, F. *P. varius*, Gyll. *P. marginatus*, F.—Rathlin Island. *P. fimetarius*, Grav. *P. umbratilis*, Grav. *P. sanguinolentus*, Grav. *P. scutatus*, Er.—New to Irish fauna. *P. cruentatus*, Gmel. *P. varians*, Payk. *P. trossulus*, Nord. *Xantholinus punctulatus*,

Payk. *X. ochraceus*, Gyll. *X. linearis*, Ol. *X. longiventris*, Heer. *Baptolinus alternans*, Glenshesk. *Othius fulvipennis*, F.—Murlough Bay. *O. laviusculus*, Steph. *O. melanocephalus*, Grav. *O. myrmecophilus*, Kies. *Lathrobium elongatum*, L. *L. fulvipenne*, Grav. *L. brunnipes*, F. *Stilicus rufipes*, Germ.—Glenshesk. *S. orbiculatus*, Er. *S. affinis*, Er.—Ballyvoy. *Stenus speculator*, Er. *S. pusillus*, Er. *S. exiguus*, Er.—Knocklayd. New to the Irish fauna. *S. declaratus*, Er. *S. brunnipes*, Steph. *S. ossium*, Steph.—Ballycastle. *S. impressus*, Germ. *S. pubescens*, Steph. *S. nitidiusculus*, Steph. *S. similis*, Herbst. *S. paganus*, Er. *Platystethus arenarius*, Fourc. *Oxytelus rugosus*, Grav. *O. laqueatus*, Marsh. *O. sculpturatus*, Grav. *Trogophleus rivularis*, Mots.—Gortconny Bog, near Ballintoy, in moss. *Lesteva sicula*, Er. *Olophrum piceum*, Gyll. *Omalium excavatum*, Steph. *O. cæsum*, Grav. *O. striatum*, Grav.—Armoy. *Anthobium ophthalmicum*, Payk. *Proteinus brachypterus*, F. *Megarthus denticollis*, Beck. *M. depressus*, Lac. *M. sinuatocollis*, Lac.

PSELAPHIDÆ.

Bythinus puncticollis, Denny. Generally distributed. *B. bulbifer*, Reich. *Bryaxis juncorum*, Leach.

SCYDMÆNIDÆ.

Scydmaenus collaris, Müll.

SILPHIDÆ.

Calyptomerus dubius, Marsh, in refuse, Ballyvoy and Whitepark Bay. *Agathidium levigatum*, Er. *A. convexum*, Sharp, in moss shakings, Hanging Wood, Ballycastle. New to the Irish fauna. *A. rotundatum*, Gyll.—Murlough Bay. *Anisotoma dubia*, Kug. *Silpha atrata*, L. and var. *subrotundata*, Steph. *Choleva velox*, Spence, Ballycastle. *C. grandicollis*, Er.—Murlough Bay. *C. tristis*, Panz. *C. watsoni*, Spence, Ballycastle.

HISTERIDÆ.

Saprinus quadristriatus, Hoff. Whitepark Bay. The only previous Irish record is Portballintrae. *Onthophilus striatus*, F.

TRICHOPTERYGIDÆ.

Ptenidium evanescens, Marsh.

COCCINELLIDÆ.

Coccinella decempunctata, L. *C. undecimpunctata*, L. *Scymnus testaceus*, Mots. Gortconny Bog, near Ballintoy, in moss. The specimens appear to be referable to this species. They present great variation in colour, some having the elytra wholly yellowish brown, whilst in others this colour is limited to a small spot on each elytron. *Rhizobius litura*, F. *Coccidula rufa*, Herbst.

NITIDULIDÆ.

Brachypterus pubescens, Er. *Epuraea æstiva*, L. *E. florea*, Er. On the flowers of *Angelica*—Ballycastle. *Meligethes æneus*, F. *M. viridescens*, F. *Cychramus luteus*, F. Abundant in fungi, Hanging Wood, Ballycastle.

CUCUJIDÆ.

Rhizophagus parallelocollis, Er. Crawling on the tombstones in Armoy Churchyard in the drizzling rain, apparently feeding on the lichen. Only one Irish specimen recorded previously.

LATHRIDIIDÆ.

Enicmus minutus, L. *Coninomus nodifer*, Westw. *Melanosthalma gibbosa*, Herbst. *M. fuscata*, Humm.

CRYPTOPHAGIDÆ.

Telmatophilus caricis, Ol. *Antherophagus nigricornis*, F.—Near Kenbane Head. *A. pallens*, Gyll.—Ballycastle. *Cryptophagus setulosus*, Sturm. *C. ? dentatus*, Herbst. *Micrambe vini*, Panz. *Atomaria fumata*, Er. *Ephistemus globosus*, Waltl.

MYCETOPHAGIDÆ.

Typhæa fumata, L.

BYRRHIDÆ.

Cytillus varius, F. *Simplocaria semistriata*, F.

PARNIDÆ.

Parnus auriculatus, Panz.

SCARABÆIDÆ.

Aphodius fimetarius, L. *A. sordidus*, F. *A. rufescens*, F. *A. porcus*, F.—Ballycastle. *A. punctato-sulcatus*, Stm. *A. contaminatus*, Herbst. *A. rufipes*, L. *A. depressus*, Kug. *Ægialia arenaria*, F. *Geotrupes spiniger*, Marsh. *G. stercorarius*, L. *G. sylvaticus*, Panz. *Serica brunnea*, L.

DASCILLIDÆ.

Cyphon punctipennis, Sharp. Gortconny Bog, near Ballintoy, common in moss and by sweeping. This rare northern species has not previously been recorded from Ireland.

PTINIDÆ.

Plinus fur, L.—Murlough Bay.

CISSIDÆ.

Cis boleti, Scop. *Octotemnus glabriculus*, Gyll. These two species occurred together in boleti and under bark at Ballycastle and Murlough Bay.

CERAMBYCIDÆ.

Rhagium bifasciatum, F.—Glenshesk.

CHRYSOMELIDÆ.

Donacia sericea, L.—Gortconny Bog. *Lema septentrionis*, Weise. Common on the Ballycastle dunes. *Chrysomela banksi*, F.—Sparingly distributed throughout the district. *C. staphylea*, L. *C. hyperici*, Forst.—Common on *Hypericum quadrangulum*, near the Hanging Wood, Ballycastle. *Phædon tumidulus*, Germ. *Lochmæa capræ*, L. *Adimonia tanacetii*, L. *Longitarsus ater*, F. *L. holsaticus*, L.—Gortconny Bog, near Ballintoy. *L. luridus*, Scop. *L. melanocephalus*, All. *L. atricillus*, L. *L. jacobæ*, Wat. *L. pusillus*, Gyll. *L. gracilis*, Kuts. *L. lævis*, Duft. *L. pellucidus*, Foudr. *Haltica palustris*, Weise.—Gortconny Bog. *Phyllotreta undulata*, Kuts. *Aphthona atratula*, All. *Sphæroderma testaceum*, F. *S. cardui*, Gyll. *Apteropoda orbiculata*, Marsh. *Mniophila muscorum*, Koch, in moss, generally distributed though not common. *Crepidodera transversa*, Marsh. *C. ferruginea*, Scop. *C. helxines*, L. *Chatocnema hortensis*, Fourc.—Near Kenbane Head. *Plectroscelis concinna*, Marsh. *Psylliodes chrysocephala*, L. *P. napi*, Koch. *Cassida hemisphærica*, Herbst.—A single specimen by general sweeping near Gortconny bog.

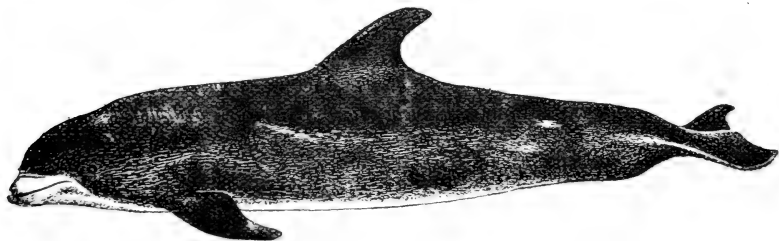
CURCULIONIDÆ.

Apion hæmatodes, Kirby. *A. dichroum*, Bedel. *A. carduorum*, Kirby, *A. vicinum*, Kirby.—Ballintoy. *A. pisi*, F. *A. ervi*, Kirby. *A. vorax*, Herbst. *A. virens*, Herbst. *A. violaceum*, Kirby. *A. hydrolapathi*, Kirby. *A. humile*, Germ. *A. gyllenhali*, Kirby—Ballintoy. *A. loti*, Kirby. *Otiorynchus atroapterus*, De G.—Ballycastle. *O. picipes*, F. *O. ligneus*, Ol. *O. sulcatus*, F. *O. rugifrons*, Gyll. *Strobosomus coryli*, F. *Tropiphorus tomentosus*, Marsh. — Sparingly. *Philopodon geminatus*, F. *Barynotus schønherri*, Zett.—Ballycastle. *B. elevatus*, Marsh.—Ballymoney. *Alophus triguttatus*, F.—A single specimen near Kenbane Head. *Sitones griseus*, F. *S. regensteiniensis*, Herbst. *S. hispidulus*, F. *S. tibialis*, Herbst. *S. sulcifrons*, Thunb. *S. flavescens*, Marsh.—Ballycastle. *Hypera ruminis*, L. *H. polygoni*, L. *H. plantaginis*, De G. *H. nigrirostris*, F. *Liosoma ovatum*, Clairv. *Orchestes salicis*, L. *Grypoidius equiseti*, F.—At the foot of Fair Head. *Erirrhinus acridulus*, L. *Anoplus plantaris*, Næz. *Mecinus pyraister*, Herbst. *Anthonomus rosine*, Des Gozis.—Beaten out of hawthorn near Ballycastle. *A. comari*, Crotch.—Generally distributed. *Caliodes rubicundus*, Herbst.—Ballycastle. *C. quercus*, F.—Ballycastle. *C. quadrimaculatus*, L. *Centhorrhynchus ericæ*, Gyll. *C. erysimi*, F. *C. contractus*, Marsh. *C. quadridens*, Panz. *C. pollinarius*, Forst. *C. rugulosus*, Herbst.—Ballycastle. *C. litura*, F. *C. pleurostigma*, Marsh. *Rhinoncus pericarpus*, L.

A WHITE-BEAKED DOLPHIN
(*LAGENORHYNCHUS ALBIROSTRIS*)
IN DUBLIN BAY.

BY R. F. SCHARFF, PH.D., M.R.I.A.

ABOUT the middle of December last, a creature, at first described as a great shark, rushed into shallow water at the Sutton Strand, which is situated on the northern side of Dublin Bay. It was no doubt pursuing fish, which form its natural food, and in doing so reached a narrow channel from which, during the receding tide, retreat became impossible. Mr. F. Manico, of Sutton, observed the struggling form in the water and managed to secure it with ropes. He also recognised that the creature was not a fish, but one of the whale-tribe, and identified it as a Grampus. As such it was conveyed to the city, and exhibited for a week to admiring crowds by Mr. M. J. M'Cabe in the South City Market. There I first saw it, and identified it as a White-beaked Dolphin, and I herewith give a much-reduced figure taken from a rough sketch of this remarkable species of the whale tribe, whose native home is in the Arctic seas.



On comparing it with the figure of the head of the same species as given in my paper¹ on the Irish Cetacea, it will be noticed that the latter was not quite correct, but I may mention that it was not my own, having been copied from a sketch in the British Museum Catalogue (Cetacea). Mr. Beddard, in his "Book of Whales," referred to in my previous paper, mentions that this Dolphin grows to a length of nine feet, but the Dublin Bay specimen measured no less than twelve feet. It was a

¹ *Irish Naturalist*, vol. ix., 1900, plate 4, fig. 10.

full-grown male. The upper side was of a beautiful shining purplish black, a few small areas being of a lighter more greyish tint. Underneath the body was cream-white, but there were a few patches of a light grey around the chin. The flippers on both upper and under surfaces were of the same colour as the back. Of the lighter patches the principal one surrounded the blow-hole on the top of the head.

I did not notice any bristles about the mouth, such as referred to by Dr. D. J. Cunningham in his excellent description of a young specimen of this Dolphin.¹ Altogether the present specimen agrees better with Mr. J. W. Clark's figure² than with that of Dr. Cunningham. But it is quite possible that the differences may be of a sexual character, Mr. Clark's specimen like my own being a male, while Dr. Cunningham's was a female. The most striking difference is that in the latter, the body tapers uniformly from behind the dorsal fin to the tail, while in the Dublin specimen it expands, especially ventrally, into a large hump close to the origin of the caudal fin.

The pectoral fin, from the junction of the anterior edge with the body to the tip, measured 1 foot 8 inches. The mouth, from the tip of the lower lip to its angle, measured 10 inches.

As regards the dentition and other osteological characteristics, I hope to be able to publish them when the specimen has been macerated, and when I have compared it with the skull found on the Co. Down coast by Mr. R. Lloyd Patterson. Mr. M'Cabe very generously presented the Dolphin to the National Museum, and the carcase was cut up under most adverse circumstances during the Christmas holidays by the Museum attendant, Robert Griffin.

Science and Art Museum, Dublin.

¹ *Proc. Zool. Society London*, 1876, p. 681.

² *Proc. Zool. Society London*, 1876, plate 64, fig. 2.

REVIEWS.

THE HISTORY OF GEOLOGY.

History of Geology and Palæontology to the End of the Nineteenth Century. By KARL ALFRED VON ZITTEL. Translated by MARIA M. OGILVIE-GORDON. Contemporary Science Series. London: Walter Scott, 1901. Price 6s.

Professor von Zittel's original work on the history of geology appeared at Munich in 1899, and was marked, like his treatises on palæontology, by a wide and accurate view of the most diverse sections of his subject. Mrs. Ogilvie-Gordon's translation is extremely welcome, especially as it is graced by admirable photographic portraits of von Zittel and Suess, and by eleven other portraits. In order to bring the original royal-8vo volume of 850 pp. into the limits set by the Contemporary Scientific Series, some shortenings and omissions have been made. The most serious of these is the loss of the precise references which form lists at the end of each chapter of the original. In the preface as translated, Prof. von Zittel trusts that these will prove useful; but the translator, in her note immediately following, states that she has omitted them with the author's approval, as also the chapter on topographical geology. The latter dealt with the works and maps devoted to special countries, notably those relating to Germany. The fact that any reduction of von Zittel's book, especially in the way of references to literature, had to be made to suit the publishing trade in England is probably a comment, not on that trade, but on the small number of scientific readers in our islands.

It is doubtful if any more suitable translator could have been found than Mrs. Ogilvie-Gordon, with her intimate knowledge of the Munich geological school, and her acquaintance with so wide a range of literature. We may thus, if only on historical grounds, approve her action in retaining for the Triassic system its full original number of pages, while the Jurassic and Cretaceous systems, so dear to Englishmen, are seriously curtailed. But when Mrs. Gordon introduces her own modes of thought into a "translation" of von Zittel, we may reasonably ask that some indication should be given. The Triassic section in the English version is in places as unrepresentative of what von Zittel actually wrote as is the amazing "translation" by American systematists of the same author's wise and eclectic "*Grundzüge der Paläontologie*." We may particularly note the passage on p. 488, which charges the Vienna workers—who seem to be regarded, from the translator's point of view, as somewhat hasty generalisers—with utilising fossils picked up by village collectors, who could not easily remember the localities of each. Even if true, this is not written in the generous Zittelian strain. On p. 492 von Zittel is represented as pointing out how Miss M. Ogilvie (his translator) contested certain conclusions in 1894 which had "been accepted and explained in the geological text-books," and "had rested

there for nearly twenty years." This passage is carefully led up to; but we can find no trace of the whole fifteen lines in the original. Considering the scrupulous detail of her work and the magnitude of the issues, Mrs. Ogilvie-Gordon's papers may fairly have required more ample notice; but why was this not obtainable in a translator's footnote? Why, again—where von Zittel does not make the observation—is the mind of Mojsisovics "biassed" (p. 489), and the work of Rothpletz "excellently" carried out (p. 493)? There is none of this harping on the "Munich School of Geology" in the masterly review as written by von Zittel.

We regret, also, that the five names connected with the Indian Survey, given by the author on his p. 648 as workers in the Himalayan Trias, should be omitted from the English translation, when space has been found for additional comments in this section.

One of the few defects of the original work is the occasional translation of the titles of books and memoirs into German, whereby it is sometimes difficult to trace the work quoted when one looks for it in a catalogue under the author's name. But the retranslation of these titles into English in the present book should have been done with the aid of a library-catalogue. Lyell's "Geological Evidences of the Antiquity of Man" becomes thus referred to as "On the Age of the Human Race" (p. 195). On the same page, the fourth book (*Buch*) of certain editions of Lyell's "Principles," too obscurely referred to by von Zittel, is translated as "fourth volume," which is puzzling to possessors of the three-volume, one-volume, or two-volume editions. The bibliography of this memorable work, however, is a continual puzzle to those who have to quote from it.

And now, with this criticism of details, it is time to thank Mrs. Ogilvie-Gordon for the considerable pains taken by her in presenting us with so valuable a work of reference. Hundreds of readers who would never have met with the German original will now have before them a truly detailed history of geology. The scope of the science is so wide that a single chapter will appeal to one worker, another chapter to a second; while the reader whose interest lies in the general philosophic outcome of the researches described, will find in the Introduction of 150 pages a record of some of the most stirring episodes of human intellectual progress.

GRENVILLE A. J. COLE.

THE NATURALIST'S DIRECTORY.

The Naturalists' Directory. 1902-3. London: L. Upcott Gill.
Pp. 168. Price 1s. 6d. nett.

This useful little annual grows each year in the amount of information given and the number of names included. There is, however, room for improvement. Under Dublin we find the long extinct Royal Geological Society of Ireland inserted, and no mention of the Royal Irish Academy! And, as in duty bound, we continue our protest against the irritating interleaved advertisements.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a large consignment of animals from the Zoological Society of London, viz. :—A Puma, a Paradoxure, a Ring-tailed Coati, a Racoon, a Vulpine Phalanger, two Cairo Spring Mice, two Vara Parrots, three Macaws, a Roseate Cockatoo, five Parakeets, two Brazilian Caracaras, and two Black Vultures. An African Civet Cat has been given by Justice H. S. Kelly, and three Indian Lizards by Mr. W. Cross. The photographic medal of the Society for the best set of animal photographs taken in the Gardens has been awarded to Mr. A. M. Geddis.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

FEBRUARY 4.—A meeting was held in the Museum, when a lecture was given by John J. Marshall on the subject :—"The Northern Blackwater : its Scenery, Antiquities, and Battlefields."

BELFAST NATURALISTS' FIELD CLUB.

JANUARY 21.—Mr. W. H. PHILLIPS presided.

Mr. GEORGE E. REILLY dealt with "Some recent discoveries at the crannoges of Lough Mourne." These consisted of a bronze pin with Celtic ornament, a twisted handle, a wrought fish-hook, specimens of pottery, including fragments of a large crucible, sinking stones, a rough stone axe, and others. The paper gave rise to a short discussion, in which Mr. Gray and Mr. Swanston took part.

The second paper was by Miss M. K. ANDREWS, dealing with encroachment of the sea on the land. A series of slides was shown in which the genesis of sea stacks could be traced from the cleft in the rock, which the sea enlarged into a cave or natural arch. The work was then taken up by atmospheric agencies, and the crown of the arch ultimately disappeared, leaving the sea stack or pillar. Coming to the immediate locality, the Co. Down coast, photographs were shown of Black Island, Newcastle. This is now a band of wrack-covered boulders, exposed at low tides, occupied but a century ago by houses and gardens. The present sea wall is over 300 feet behind the ancient wall. Encroachments at Cultra were also described. Reference was made to the work done by the committee of the British Association in 1895.

Miss WALKINGTON, LL.D., then gave an account of the district between Newtownards and Knock. Many of the places described are but little known, but on account of their beauty or historic interest are worthy of a visit.

Mr. JAMES ORR read a short paper on "Sea Urchins," illustrated by lantern slides.

The next paper was by Mr. NEVIN H. FOSTER on "Feathers." Mr. Foster concluded by appealing to the ladies to help the preservation of rare birds by refusing to wear feathers in any form. The paper was illustrated by lantern slides showing structure of feathers.

Mr. R. WELCH exhibited a number of slides on various subjects, including Night-jars' eggs and young; a slide of *Xenophora* from Japan seas illustrating protective mimicry in molluscs. A number of views of the Norber perched blocks were shown.

The concluding paper was by Mr. W. A. GREEN explaining the introduction of foreign mollusca into this country. Bananas imported from the Canary Islands afford a safe shelter for several species of shells, and occasionally spiders are found when the bunches are opened up. A beautiful little beetle occurs on Californian apples, whilst in currants, raisins, flax-seed, and other imports, shells are sometimes found indigenous to the exporting countries—the Greek Islands, Turkey in Europe, and Turkey in Asia. An excellent photograph by Mr. R. Welch illustrated the machine used by Messrs. Forster Green & Co. in cleaning and washing imported currants, by means of which sand, stones, footstalks, and other foreign material are effectually separated from the fruit. The lily tanks of the Dublin Botanic Gardens also afforded a striking proof of the introduction of mollusca on the stems of various tropical lilies.

The election of three new members brought the meeting to a close.

DUBLIN NATURALISTS' FIELD CLUB.

FEBRUARY 11.—F. W. BURBIDGE, M.A. (Vice-President) in the Chair. Professor COLE read a paper entitled "The Problems of the Conglomerate of Lisbellaw, County Fermanagh." He explained the relation of this rock to the neighbouring sediments, by means of diagrams, and mentioned the opinions of Portlock and others regarding their age. The conglomerates in question are chiefly quartz conglomerates, with some few pebbles of igneous rocks, chiefly granite, some of the latter being occasionally several cubic yards in bulk. The microscope shows the presence of numerous volcanic fragments (andesites, &c.), as if contemporaneous volcanic action were in progress. The conglomerates occur along with highly-tilted sediments, which contain Upper Silurian (Gotlandian) fossils, and apparently rest on these, thus seeming to belong to a still higher horizon. Professor Cole pointed out how any evidence that would determine their age must also affect our ideas of the age of the included granite blocks. He pointed out that the period during which the greatest upheaval of granite took place in Ireland was connected with the Caledonian movements (post-Upper Silurian), and that the blocks thus pointed out the existence of pre-Silurian and, possibly, Archæan granite.

Mr. SEYMOUR, in criticizing the paper, explained the older and the most recent reading by the Geological Survey of these Lisbellaw conglomerates, which are regarded by Mr. M'Henry as fairly high up in the Upper Silurian, thus agreeing more or less with Prof. Cole's opinion. Though the conglomerates did appear to rest on the sediments, it was,

nevertheless, possible that these beds may now show a reversed dip, in which case the Lisbellaw rocks might be basal conglomerates of the Upper Silurian formation. He thought that the Pomeroy rocks would, when completely studied, throw much light on the rocks of the Lisbellaw area, and that the latter area could not be satisfactorily studied as a separate entity, and without reference to some other localities in Ireland where similar phenomena were presented.

Mr. G. W. LAMPLUGH also spoke on the paper, and Prof. Cole replied.

Mr. BURBIDGE then read an instructive paper entitled "Nature Knowledge, or Hints to Young Collectors." He impressed on members that it was not at all necessary to travel far afield in order to do good work, but that a vast amount of original research might be done in one's garden. As an example, he instanced the find by Miss Kelsall of a worm new to science, and which she obtained in this limited area. A large amount of work still required to be done, for instance in the collection of ripe seeds, and many other, suitable field for research were also indicated by Mr. Burbidge. Mr. PRAEGER, in criticizing the paper, raised the question as to what could be called an annual plant, and Dr. PETHYBRIDGE mentioned the common Groundsel as an example of one species that might be studied, with a view to the elucidation of this question. Prof. Cole, and Messrs. Wright and Seymour, also spoke on the paper.

Messrs. T. Crook and Wm. S. Wall were elected members of the Club, and two nominations for membership were received.

NOTES.

BOTANY.

Sub-fossil Yew-wood.

Dr. Conwentz, who has published papers on the spontaneous growth of the Yew-tree in Germany, read a paper at the last meeting of the British Association on the past history of this interesting tree in Great Britain and Ireland. By microscopical examination he has proved the occurrence of much sub-fossil Yew-wood, particularly from buried peat-beds and submerged forests in this country; but he is anxious for more material from localities in England and Ireland, and he asks all who have an opportunity of collecting examples of reddish woods, looking like Yew, to post to him small pieces for examination. His address is: "Prof. Dr. CONWENTZ, Director of the Museum, Danzig, Germany," and should be labelled outside "Of no value."

E. T. NEWTON.

Jermyn-street, London.

A New British Botanical Magazine.

The first number of the *New Phytologist* has appeared (January 23), under the editorship of Mr. A. G. Tansley, M.A., F.L.S., of University College, London. The preliminary circular announcing this venture did not wholly convince us of its desirability, and the first number leaves us in the same state of hesitation.

ZOOLOGY.

Rooks.

It is generally asserted by farmers that Rooks are increasing year by year in this country. I should like to get the opinion of some of your correspondents in various districts on this subject.

My own experience in this neighbourhood is that they are increasing. I have rather an unique experience in this place. The same year, in fact the same month, in which I was appointed to this parish about twenty pairs of Rooks came to the foot of my lawn, and established the nucleus of a perfectly new rookery (there never was one here before) by building as many nests and rearing their young. I took special care that they should not be disturbed. It is now sixteen years ago, and every year since the number of nests has increased. There were about 200 last year. I have a sort of family affection for them because they came here with me; they do us no harm, and they are most confiding in the breeding season. I can see very plainly through a telescope their nest-building and other operations, which are most interesting.

Since the formation of this rookery another curious innovation has been developing itself. Each year, as winter is drawing near, thousands and thousands of other Rooks and Jackdaws—probably Scandinavian birds—assemble here in the evening, coming in from all directions in small detachments; and as dusk begins to fall, having rested and talked on the trees in and around the lawn, they retire across the river and sleep in a wood in the Duke of Manchester's demense.

Yet another new development in the Crow family here. For the last five or six years Starlings come here—without exaggeration in millions—in the late evening, and absolutely cover the trees, bending down their branches with their weight. Sometimes they alight on the lawn, making it appear in the distance as if it were top-dressed with dark manure.

There they chatter and talk, and as the spring approaches sing. Then all of a sudden they rise, making a noise like distant thunder. They, too, fly across into the Duke's demense; but before alighting on the trees in which they sleep they perform the most wonderful evolutions, wheeling in detachments hither and thither like a vast army of infantry at drill, and appearing against the fading light of the western sky like dark clouds, so great are their numbers.

I fancy there are not quite so many this year as formerly. As spring approaches both Rooks and Starlings gradually divide, and finally disappear, leaving only the few native Rooks to re-build their nests and look after their families.

WILLIAM M'ENDOO.

Tanderagee.

A LIST OF THE DIPTERA MET WITH IN CORK AND KERRY DURING THE SUMMER OF 1901,

WITH SOME NOTES ON THEIR HABITS, ETC.

BY LIEUT.-COL. J. W. YERBURY (LATE R.A.), F.Z.S., F.E.S.

Two or three visits paid to Glencar, Waterville, &c., during the shooting season, had duly impressed me with an idea of the probable richness of that district as an entomological hunting-ground, and this, combined with the paucity of Irish records to be found in Verrall's "British Flies," vol. viii., made me decide to spend the summer months of 1901 in that neighbourhood.

The results have, perhaps, been unsatisfactory—no large showy novelties having been met with, while the richness of the dipterous fauna cannot compare with that of a good district in England or Scotland; still, to be able to record the capture of such insects as *Microdon mutabilis*, *Eristalis cryptarum*, *Gymnosoma rotundatum*, and *Allophora fasciata* prevents these results from being described as bad.

All specimens connected with the forthcoming volume (vol. v.) of Verrall's "British Flies" have been handed over to Mr. Verrall *en masse*, and will probably be referred to in due course, but pending the issue of that work the identifications must be taken as provisional.

I am indebted to Messrs. Verrall and Austen for much assistance in the identification and verification of the species enumerated; in fact, but for the kind aid of these gentlemen, this list would probably have never seen the light.

The publication of local lists of Diptera is of doubtful utility; still a beginning has to be made, and it is hoped that this list, combined with those published by Haliday, may form a nucleus round which a complete catalogue of the Diptera of Ireland can be built up. The identification of these Irish specimens has presented many unexpected difficulties—many (one may even say most) of them showing marked variation from the types.

MYCETOPHILIDÆ.

Asindulum flavum, Winn.—Parknasilla, July 17.

BIBIONIDÆ.

Dilophus febrilis, Linn.—Caragh Lake, Aug. 14, male and female (in coitû).

SIMULIDÆ.

Simulium reptans ? Linn.—Glengariff, June 17.

CHIRONOMIDÆ.

Chironomus annularis, Degeer.—Kenmare, June 26.

C. sp. inc.—Parknasilla, July 17.

C. sp. inc.—Waterville, Aug. 2.

Ceratopogon sp. inc.—Glengariff, June 17, taken in company with *S. reptans*, and these two species seem to be the common biting pests of the district, where, however, biting flies are not common, their place being taken by ticks (*Ixodes*) of many species and in all stages of development. This *Ceratopogon* is much commoner than *S. reptans*, the proportion being roughly estimated at 6:1. In Scotland the proportion would probably be the other way about.

CULICIDÆ.

Culex nemorosus ? Meig.—Kenmare, June 26. A specimen referred to this species with great doubt, as it has no silvery fleck at the tips of the femora.

PTYCHOPTERIDÆ.

Ptychoptera scutellaris, Meig.—Loo Bridge, June 29.

LIMNOBIDÆ.

Goniomyia tenella, Meig.—Glengariff, June 15.

Limnophila ochracea, Meig.—Glengariff, June 11.

TIPULIDÆ.

Pachyrrhina annulicornis, Meig.—Glengariff, June 17.

Tipula lateralis, Meig.—Waterville, July 26.

T. gigantea.—Glengariff, June 12.

From the above meagre list it will be seen at a glance how little attention was paid to the Orthorrhapha Nematocera.

STRATIOMYIDÆ.

Nemotelus sp. inc.—Kenmare, male, June 30. Mr. Verrall notes on this specimen: "Almost certainly an undescribed species, differing from *N. patherinus*, Linn., by shorter snout, more blackened anterior tibiae, and many other small characters."

Stratiomys furcata, Fab.—Caragh Lake, Aug. 20. A single specimen. *S. furcata* and *S. riparia* are probably only forms of one species.

- Odontomyia viridula**, Fab.—Kenmare, Darrynane, Waterville. Very common at the last-named locality round the shores of the small loch near the mouth of the River Inney.
- Chrysonotus bipunctatus**, Scop.—Phoenix Park, Dublin, male, Sept. 5. Sitting on wet mud in the stream running down near The Magazine.
- Sargus flavipes**, Meig.—Valencia Island, Caragh Lake, and Kenmare. Very common at Caragh Lake—the females sitting on cow-dung, the males on leaves of sycamore, lime, aspen, &c. Mr. Verrall notes of a ♀ taken at Valencia Island, 10th Aug., that it seems identical with the Forest of Dean species (*S. rufipes*).
- S. Iridatus**, Scop.—Glengariff, June 18. Kenmare, June 27 and July 7. Parknasilla, July 18. This species appears in Verrail's List as *S. infuscatus*, Meig.
- Chloromyia formosa**, Scop.—Kenmare, June 28. Darrynane, July 31.
- Microchrysa polita**, Linn.—Glengariff, June 15 to 19.
- Beris vallata**, Forst.—Kenmare, June 28. Cloonee, July 3. Parknasilla, July 24.

TABANIDÆ.

- Haematopota pluvialis**, Linn.—Kenmare, Parknasilla, Ardgroom, Beown Mountain, and Loo Bridge. Common.
- H. crassicornis**, Whlbg.—Glengariff, June 12.
- Theriopectes** sp.—Kenmare, June 28 to July 4. Glengariff, June 13. Mr. Verrall considers these specimens as probably distinct from *T. solstitialis*, Meig.
- T. montanus**, Meig.—Loo Bridge, Staigue Fort, and Glengariff in some numbers; the males common at Loo Bridge, sitting on Umbelliferæ heads.
- Atylotus fulvus**, Meig.—Glengariff, male, June 23. Kenmare, June 30 to July 10. Loo Bridge, July 6. Uncommon.
- Tabanus sudeticus**? Zlr.—Kenmare, very common. Glencar, Loo Bridge, and Staigue Fort. Mr. Verrall does not seem to be satisfied about the identification of these specimens, and even suggests that they may belong to an undescribed species; he adds, "make somebody catch the male next summer." Any volunteers for this job! The females are very common along both banks of the Kenmare River, quite close to the Southern Hotel. So much so that on July 7th, near Killowen Church, I had 18 specimens in my cyanide bottle at one time.
- Chrysops relictus**, Meig.—Kenmare, both sexes plentiful in some marshy ground near Drumnassig Bridge, Parknasilla, Loo Bridge.

LEPTIDÆ.

- Leptis scolopacea**, Linn.—Glengariff, June 12. Cloonee, July 3. Parknasilla, July 12. Beown Mountain, July 23.

L. lineola, Fab.—Kenmare, July 9. Waterville, July 28 and August 1. Darrynane, July 31. Glencar, August 16. Common.

Chrysopilus auratus, Fab.—Glengarriff, June 12. Common everywhere.

Atherix marginata, Fab.—Waterville, both sexes, August 3. Kenmare, female, August 26. Rare.

ASILIDÆ.

Philonicus albiceps, Meig.—Waterville and Dooks (Glenbeigh), very common on the sand hills. A female taken at Dooks was preying on a *Lucilia*, but at Waterville the usual quarry was *Orygma luctuosum*, though now and again an Anthomyid was taken. On more than one occasion instances of cannibalism were met with, and one (at any rate) of these was that of a female preying on a female. This was the only Asilid met with, and, speaking generally, predacious flies (*Scatophaga stercoraria* excepted) were uncommon. A few Empidæ and Dolichopidæ, only one species of Cordylura (and that in small numbers) and Scatophaginæ in some numbers, both in individuals and species, were almost the only representatives of this group of Diptera.

BOMBYLIDÆ.

Bombylius canescens, Mik.—Glengarriff, June 16, 18, and 19. Kenmare, June 27 and July 10. Common. As nothing has been put on record regarding the hosts, ovipositing habits, &c., of this Dipteron the following notes may be of interest:—Roughty Bridge, near Kenmare, June 27. A female was observed hovering over a bit of bare ground containing numerous burrows of small Hymenoptera; she was hovering about 12 inches above the surface of the ground, and every now and again brought the point of her abdomen round under her thorax, and gave a sort of "flick," which gave one the impression that she was throwing off an egg; if such was the case, the eggs must be cast about at hazard, the larvæ finding their way after hatching to the nest of the Hymenopteron, either by clinging to the host, or else by crawling about until a suitable burrow is found. The above female Bombylius was caught, and also several bees, the apparent owners of the burrows over which she was hovering. The bees have been kindly identified for me by Mr. Saunders as *Halictus rubicundus* and *H. nitidiusculus*.

July 10th.—South Bank of the Kenmare River, about one mile below the Suspension Bridge.

On this occasion *Bombylius canescens* was flying in some numbers over a bank running alongside of a country road (a rough estimate of the numbers made at the time was 40 specimens). In order to ascertain what was going on, a length of about 4 yards was selected and a watch kept on the insects working this stretch. The regular frequenters appeared to be 11 Bombylii, numerous bees, and a few

Anthomyidæ. The Bombylii were, however, acting in a manner quite different from the female observed on the 27th June; several times one of them was seen to settle on the ground near the burrow of a Hymenopteron and to remain quite still, and it was assumed that she was ovipositing, but though the spot was carefully marked and the neighbourhood searched with a lens, no sign of an egg could be found, and the conclusion eventually arrived at was that they were not ovipositing, but were all old spent females basking in the sun and making the most of the last few hours of their existence. All these (40?) Bombylii were much worn, and therefore useless as specimens. A stroke of the net was, however, made at one of them, and resulted in the capture of 1 Bee and 1 Bombylius. The bee has been identified for me by Mr. Saunders as *Halictus villosus*, female. *Bombylius canescens* appears, therefore, to be a parasite on more than one species of *Halictus*. In the *E. M. M.*, vol. xiv., 1878, p. 196, Dr. Chapman published some remarks "On the Economy, &c., of Bombylius," but neither the name of the species of Bombylius observed ovipositing nor that of the host was given, while the remarks concerning the larvæ, &c., all refer to *Bombylius major*. The ovipositing species was, however, probably *B. canescens*, and Dr. Chapman's observations agree fairly well with mine, though in my case the female did not approach nearly so close to the burrow of the Hymenopteron, nor did my sight allow me to see a small white egg thrown off.

THEREVIDÆ.

- Thereva annulata**, Fab.—Waterville, June 30—July 2. Dooks (Glenbeigh), Aug. 15. Fairly common on the sand hills.
T. sp. inc.—Darrynane, female, July 31. Waterville, female, Aug. 2. The only specimens. These two specimens are in Mr. Verrall's hands, and have not yet been clearly identified.

EMPIDÆ.

- Hybos fumipennis**, Meig.—Beown Mountain, July 22. Not in Verrall's List.
Rhamphomyia tenuirostris, Fall.—Loo Bridge, Aug. 28. This may belong to *R. variabilis*, Fall., of Verrall's List, but the insect agrees best with the description of *R. tenuirostris*.
R. flava, Fall.—Glengariff, male, June 12.
Empis livida, Linn.—Kenmare, June 30 to July 7. Common, Valencia Island, Aug. 8.
Hilara sp. inc.—Waterville, July 26.
Ædalea stigmatella, Zett.—Glengariff, June 12,
Ocydromia glabricula, Fall.—Waterville, Aug. 4.
Tachydromia sp. inc.—Waterville, July 26.

DOLICHOPIDÆ.

- Psilopus platypterus**, Fab.—Glengariff, male, June 15; female, June 18. Parknasilla, male, July 21. Waterville, female, Aug. 4.
- Dolichopus atripes**, Meig.—Beown Mountain, male, July 22.
- D. atratus**, Meig.—Glengariff, male and female *in coitu*, June 17. Glengariff, three females, June 12.
- D. discifer**, Stanh.—Glengariff, male and female *in coitu*, June 15.
- D. urbanus**, Meig.—Glengariff, male, June 12.
- D. acuticornis**, Wied.—Waterville, male, July 27 (in italics in Verrall's List).
- D. æneus**, Degeer.—Glengariff, male, June 13.
- Tachytrechus consobrinus**, Walk.—Kenmare, female, July 2.
- Gymnopternus cupreus**, Fall.—Glengariff, male, June 12.
- G. ærosus**, Fall.—Kenmare, female, July 2.
- Argyra diaphana**, Fab.—Glengariff, female, June 12.
- A. argentina**, Meig.—Valencia Island, male, Aug. 8.
- A. leucocephala**, Meig.—Glengariff, male, June 12. Darrynane, male, July 31.
- Rhaphium longicorne**, Fall.—Glengariff, three males, June 21. Glengariff, two females, June 12.
- Hydrophorus præcox**, Lehm.—Waterville, male and female, July 30.
- Liancalus virens**, Scop.—Valencia Island, male, Aug. 7. Valencia Island, female, Aug. 8.

LONCHOPTERIDÆ.

- Lonchoptera trilineata**, Zett.—Kenmare, July 2. Not in Verrall's List, but was recorded by Brunetti in *Entomologist*, 1890, p. 124; *vide* too Verrall's remarks on p. 151.

PIPUNCULIDÆ.

- Pipunculus furcatus**, Egger.—Glengariff, male, June 15. Kenmare, female, June 26. Two unusually large specimens.
- P. zonatus**, Zett.—Glengariff, male, June 17. Kenmare, July 5. Parknasilla, July 24.
- P. varipes**, Meig.—Valencia Island, male, August 7.
- P. pratorum**, Fall.—Glengariff, male, June 17. Darrynane, male, July 31. Valencia Island, female, August 10.
- P. flavipes**, Meig.—Glengariff, female, June 13. Kenmare, male, September 1. Three specimens.
- P. confusus**, Verr.—Glengariff, female, June 12.
- P. littoralis**, Beck.—Waterville, 27th July to 2nd August. Very common on the sand hills near the mouth of the Inny.
- Chalarus spurius**, Fall.—Valencia Island, male, August 8. Glengariff, female, June 12. Fairly common.
- Verrallia aucta**, Fall.—Glengariff, male, June 28. Kenmare, male, June 27. Parknasilla, female, July 12. Rather rare.

SYRPHIDÆ.

Paragus tibialis, Fall.—Waterville, July 28. Staigue Fort, July 19. Kenmare, July 5. Loo Bridge, July 6. Ardgroom, July 20. Uncommon.

Pipizella virens, Fab.—Beown Mountain, male, July 22. Parknasilla, female, July 15. Kenmare, female, June 28. Uncommon.

P. Heringi, Zett.—Glengariff, female, June 24. The only specimen.

Pipiza noctiluca, Linn.—Kenmare, two males, June 26 and July 7. Parknasilla, male, July 13. Darrynane, July 31.

P. fenestrata, Meig.—Valencia Island male, August 7; female, August 10. Loo Bridge, female, August 28. Caragh Lake, female, August 13. These four specimens apparently belong to Verrall's interpretation of *P. fenestrata* (Verrall, "British Flies," viii., p. 171). Whether they belong to *P. fenestrata* of Meigen is another question.

P. bimaculata, Meig.—Glengariff, males, June 14 to 23. Four specimens.

P. signata, Meig.—Kenmare, male, July 4.

The above four species agree fairly well with the description given in Verrall's "British Flies," but the identification is by no means certain.

Liogaster metallina, Fab.—Kenmare, Loo Bridge, Glengariff, and Valencia Island. Common.

Chrysogaster splendens, Meig.—Kenmare, June 28 and July 4. Not uncommon.

C. hirtella, Loew—Common and generally distributed. Glengariff, Gloonee, Ardgroom, Loo Bridge, Waterville, and Glencar.

C. Macquarti, Loew—Loo Bridge, male, August 24. A female taken at Loo Bridge on the same day is referred to this species with doubt.

C. virescens, Loew—Glengariff, June 12 and 15.

C. chalybeata, Meig.—Waterville, August 2. Immature.

C. solstitialis, Fall.—Kenmare, July 9. The only specimen, though this species is generally looked on as a common insect.

Chilosia scutellata, Fall.—Loo Bridge, male, July 6; Parknasilla, male, July 21.

C. pulchripes, Loew—Valencia Island, female, Aug. 7.

C. variabilis, Panz.—Kenmare, male and female, July 4; female, July 5.

C. illustrata, Harris—Kenmare, Parknasilla, Waterville, and Valencia Island. Very common. Most of these specimens are clothed with dense foxy-red pubescence; this beautiful pubescence gives them (when flying in the sunshine) almost the appearance of *C. chrysocoma*. This Irish form almost deserves a varietal name.

C. albitarsis, Meig.—Glengariff, female, June 20. If *C. flavimana*, Meig., be a distinct species, these two specimens probably belong thereto.

Some specimens of this genus, representing 3 sp. inc., have been given to Mr. Verrall for identification.

- Platychirus manicatus**, Meig.—Waterville, females, July 30 and Aug. 2.
- P. peltatus**, Meig.—Loo Bridge, males, July 6; Kenmare, male, June 30.
- P. scutatus**, Meig.—Glengariff, male, June 12; Loo Bridge, male, Aug. 28; Valencia Island, Aug. 7; Darrynane, female, July 31; Kenmare, July 2.
- P. albimanus**, Fab.—Caragh Lake, male, Aug. 14; Parknasilla, female, July 24; Caragh Lake, female, Aug. 20.
- P. fulviventris**, Macq.—Kenmare, male, June 27; 3 specimens at a bed of the Common Reed near Roughty Bridge.
- P. perpallidus**, Verr.—Loo Bridge, male, Aug. 24; female, Aug. 24 and 25. The male appears to have a fringe of distinctly dark hairs on the middle part of the front femora behind; according to Verrall (*l.c.* p. 291) this fringe should be all yellow.
- P. clypeatus**, Meig.—Numerous specimens from Kenmare, Loo Bridge, Parknasilla, Valencia Island, and Caragh Lake.
- P. angustatus**, Zett.—Kenmare, male, July 10 and Aug. 27; Parknasilla, male, July 13; Loo Bridge, male, Aug. 24; Valencia Island, both sexes, Aug. 7; Clonee, female, July 3.
- Pyrophæna granditarsa**, Forster—Kenmare, July 2; Loo Bridge, June 28; Glengariff, June 18; Caragh Lake, Aug. 13; Parknasilla, July 18. Not so common as the next species.
- P. rosarum**, Fab.—Glengariff, June 16, 19, 20; Kenmare, July 10; Cloonee, July 3; Waterville, Aug. 3. Common.
- Melanostoma mellinum**, Linn.—Kenmare, Loo Bridge, Parknasilla, Darrynane, Waterville, Caragh Lake, and Glencar. Common everywhere, though, strange to say, no specimens from Glengariff have been brought away.
- M. scalare**, Fab.—Caragh Lake, male, Aug. 20; Valencia Island, male, Aug. 10; Kenmare, male, Sept. 1; Loo Bridge, male, Aug. 28.
- Xanthandrus comtus**, Harris.—Loo Bridge, male, July 6. The only specimen.
- Leucozona lucorum**, Linn.—Parknasilla, July 18; Darrynane, July 31. Seen at Kenmare. Uncommon.
- Ischyosyrphus glaucius**, Linn.—Kenmare, male, June 30; female, June 30 and July 7; Darrynane, female, July 31; Valencia Island, female, Aug. 8. Common.
- I. laternarius**, Müller—Kenmare, Parknasilla, Waterville, and Valencia Island. Common.
- Didea intermedia**, Loew—Parknasilla, male, July 12; female, July 21; Glengariff, female, June. Rare.
- Catabomba pyrastris**, Linn.—Kenmare, female, July 9; Waterville, female, July 29 and 30; Dooks, near Glenbeigh, female, Aug. 15. Uncommon.
- Syrphus albostriatus**, Fall.—Glengariff, male, June 16, 17; Darrynane, July 31. Uncommon.

- Syrphus tricinctus**, Fall.—Glengariff, female, June 15. Rare.
- S. torvus**, Osten-Sacken—Valencia Island, male, Aug. 7. Rare; the only specimen.
- S. grossulariæ**, Meig.—Kenmare, male, July 10; female, July 7; Valencia Island, male and female, Aug. 7; female, Aug. 10. Common at Valencia Island.
- S. ribesli**, Linn.—Valencia Island, female, Aug. 10; Loo Bridge, female, Aug. 28; Parknasilla, female, July 12. Probably common.
- S. vitripennis**, Meig.—Glengariff, Kenmare, Loo Bridge, Parknasilla, and Valencia Island. V. common.
- S. corollæ**, Fab.—Waterville, male, July 27. Darrynane, July 31. Caragh Lake, Aug. 14. Apparently not common.
- S. luniger**, Meig.—Glengariff, male, June 15. Loo Bridge, Aug. 24. Caragh Lake, Aug. 13. Apparently uncommon.
- S. bifasciatus**, Fab.—Kenmare, male, June 30. Glengariff, female June 16. Appears to be uncommon.
- S. balteatus**, De Geer—Kenmare, male, June 30. Waterville, male, Aug. 3. Caragh Lake, male, Aug. 14. Probably common, though only four males have been brought away.
- S. cinctellus**, Zett.—Glengariff, male, June 14; female, June 12. Parknasilla, July 24. Uncommon.
- S. auricollis**, Meig.; var. **maculicomis**, Zett.—Valencia Island, male, Aug. 8; female, Aug. 7. Apparently uncommon.
- S. umbellatarum**, Fab.—Parknasilla, female, July 23. Only specimen.
- S. arcticus**, Zett.—Kenmare, male, Aug. 26. Rare. Only specimen taken sitting on a leaf of Alder, near Drumnassig Bridge.
- Sphærophoria menthastri**, Linn. var. **picta**, Meig.—Loo Bridge, male, Aug. 28. Kenmare, male, June 26. Probably common, though only two specimens of *Sphærophoria* have been brought away.
- Baccha obscuripennis**, Meig.—Glengariff, June 23. Singleton.
- B. elongata**, Fab.—Loo Bridge, June 29. Valencia Island, Aug. 8. Uncommon.
- Sphegina clunipes**, Fall.—Parknasilla, July 24. Only specimen.
- Ascia podagrica**, Fab.—Kenmare, June 26.
- A. floralis**, Meig.—Glengariff and Parknasilla, both sexes, July 12. Ardgroom, July 20. Waterville, Aug. 8. These specimens apparently all belong to Verrall's interpretation of *Ascia floralis*, though all agree better with Meigen's description of *A. dispar*. Still, having due regard for Verrall's remarks under the head of Synonymy (*l.c.* p. 473), the former name has been preferred.
- Rhingia campestris**, Meig.—Glengariff, June 12. Kenmare, June 28. Common everywhere.
- Volucella bombylans**, Linn.—Kenmare, Parknasilla, and Valencia Island. Very common. The common form in Co. Kerry appears to be var. *plumata*, typical *bombylans* is not common, while var. *haemorrhoidalis* was not met with.
- V. pellucens**, Linn.—Glengariff, June 16. Kenmare, July 9. Common everywhere.

- Eristalis sepulchralis**, Fab.—Kenmare, June 27. Loo Bridge, June 29. Very common at Kenmare, on the shores of the Kenmare River.
- E. æneus**, Scop.—Glengariff, June 18. Kenmare, June 28, July 4 and 7. Very common on the shores of the Kenmare River.
- E. cryptarum**, Fab.—Loo Bridge, a male and five females, July 6 and 8. Round the flowers of *Potentilla paludosa*; rare. This rare species has only been recorded from Devonshire (southern fringe of Dartmoor), New Forest, and Dorset. In Devonshire it showed a partiality for the Whortleberry (*V. oxycoccus*). Its discovery, sitting on the flowers of *Potentilla* at Loo Bridge, was, therefore, an unexpected revelation.
- Eristalis tenax**, Linn.—Loo Bridge, July 6; probably common, though only a single specimen has been brought away.
- E. intricarius**, Linn.—Kenmare, July 2; Loo Bridge, July 6; Parknasilla, July 12 and 21. Common and generally distributed.
- E. arbustorum**, Linn.—Waterville, male, July 27; female, Aug. 2. Probably common.
- E. pertinax**, Scop.—Glengariff, June 12; Loo Bridge, male, June 28; Valencia Island, male, Aug. 7; Waterville, July 27; Loo Bridge, July 8. The two males from Loo Bridge and Valencia Island show the dark markings round the stigma to an unusual extent.
- E. horticola**, De Geer—Loo Bridge, June 28; Glengariff, June 13 and 24. Probably common.
- Mylatropa florea**, Linn.—Kenmare, July 4; Parknasilla, July 12. Common everywhere.
- Helophilus hybridus**, Loew—Waterville, Aug. 2. Common at a small loch near the mouth of the Inny.
- H. pendulus**, Linn.—Glengariff, June 12; Kenmare, June 30. Common everywhere.
- H. versicolor**, Fab.—Loo Bridge, July 6; only specimen. The well-marked black tip to the front tibiæ of this specimen is worthy of note.
- H. lunulatus**, Meig.—Cloonee, July 3; Loo Bridge, July 8. Uncommon.
- H. lineatus**, Fab.—Glengariff, June 21; Loo Bridge, June 29. Not uncommon.
- Criorrhina berberina**, Fab.—Glengariff, June 23. Rare—one other specimen seen.
- Xylota segnis**, Linn.—Glengariff, June 12 and 23; Kenmare, July 4 and 5; Valencia Island, Aug. 10. Common and generally distributed.
- X. sylvarum**, Linn.—Kenmare, June 30 and July 8, Parknasilla. Not common.
- Syritta pipiens**, Linn.—Glengariff, June 14 and 16. Very common.
- Chrysochlamys cuprea**, Scop.—Kenmare, June 28. The only specimen seen.
- Sericomyia borealis**, Fall.—Glengariff, June 12, 15, 18. Common everywhere.

Sericomyia lappona, Linn.—Glengariff, June 14. Seen at Kenmare and Parknasilla—rather rare.

Chrysotoxum arcuatum, Linn.—Kenmare, June 28 and September 1. Uncommon.

C. festivum, Linn.—Glengariff, June 13-24; Kenmare, June 27—July 4; Parknasilla, July 13. Common.

C. bicinctum, Linn.—Glengariff, June 21 and 23; Kenmare, June 28. Very common.

Microdon mutabilis, Linn.—Glengariff, June 13, 15, 24; Kenmare, June 28. Both sexes of this rare species were taken at Glengariff; it was found in two widely separated localities, while at Kenmare it was found on the south side of the river, about a mile below the Suspension Bridge. In all these localities the species showed a weakness for the Sweet Gale (*Myrica gale*).

CONOPIDÆ.

Conops quadrifasciatus, De Geer—Kenmare, male and female, *in coitu*, Sept. 1. Males common at Kenmare and Caragh Lake during latter half of August; females rare.

Sicus ferrugineus, Linn.—Very common at Glengariff, Cloonee, Kenmare, Parknasilla, Waterville, Valencia Island, and Caragh Lake.

Myopa buccata, Linn.—Glengariff, June 15; Kenmare, June 28. Only specimens seen.

M. fasciata, Meig.—Kenmare, Aug. 23. Only specimen.

MUSCIDÆ.

Exorista fimbriata, Meig.—Waterville, male, July 28; Darrynane, female, July 31; Beown Mountain, July 22.

Exorista sp. inc.—Waterville, July 28.

Exorista sp. inc.—Waterville, male and females, July 28; Valencia Island, Aug. 7; Loo Bridge, July 8.

Exorista sp. inc.—Glengariff, female, June 24.

Exorista sp. inc. (*Parexorista*, Brauer and Von Berg.)—Valencia Island, Aug. 8.

Blepharidea sp. inc. (*Exorista*, olim.)—Parknasilla, male, bred from pupa of *Zygana filipendulæ*; pupa found July 15, fly emerged Aug. 4.

B. vulgaris, Fall. (*Exorista vulgaris*, Verrall's List).—Loo Bridge, July 7.

Phorocera cilipeda, Rond.—Parknasilla, female, bred from pupa of *Z. filipendulæ*; pupa found July 15, fly emerged Aug. 8.

Eutachina præpotens, Meig.—Waterville; both sexes; July 27.

E. rustica, Meig.—Kenmare, June 26 and 30; Cloonee, July 3.

Perichæta unicolor, Fall.—Glengariff, June 23. Not in Verrall's List.

Thelymorpha marmorata, Fab.—Valencia Island, Aug. 10.

Somoleja rebaptirata, Rond. (*Polidea anea*, Verrall's List).—Parknasilla, July 17; Glengariff, June 14; Valencia Island, Aug. 13. Common.

Degeeria convexifrons, Zett.—Waterville, Aug. 3. Only specimen.

Thelaira leucozona, Panz.—Kenmare, June 26 and July 7; Parknasilla, July 12, 13, and 17; Ardgroom, July 20; Darrynane, July 31; Waterville, Aug. 1; Glencar, Aug. 16; and var. *nigripes*, Fab., Cloonee, July 3. Males very common. The female and the var. *nigripes* decidedly uncommon.

Demoticus frontatus, Boh.—Parknasilla, July 13; Waterville, July 28; Caragh Lake, Aug. 13; Kenmare, Aug. 27. Uncommon.

Olivieria lateralis, Fab.—Kenmare, July 7; Loo Bridge, Aug. 28. Very common.

Lophosia fasciata, Meig.—Parknasilla, July 24. At the time when this specimen was identified (24th July) the species had never been recorded as British, but about the same date Mr. Adams took three specimens in the New Forest (in his glass-house), and these specimens were identified for him later on by Mr. Austen and were recorded *E.M.M.*, Sept., 1901, p. 212.

Micropalpus vulpinus, Fall.—Glengariff, June 16; Loo Bridge, June 29; Kenmare, June 30; Parknasilla, July 12 and 24; Staigue Fort, July 19. Very common.

Erigone radicum, Fab.—Caragh Lake, Aug. 20; Kenmare, Sep. 1.

E. sp. inc. (near *consobrina*, Meig.)—Parknasilla, July 12; Waterville, July 22 and 23, and Aug. 1; Valencia Island, Aug. 7.

E. sp. inc.—Waterville, July 28.

E. sp. inc.—Kenmare, Sep. 1. Two specimens.

Tachina grossa, Linn. (*Echinomyia grossa*, Verrall's List).—Common, and generally distributed during July and August; probably the most interesting locality is the cairn, on the summit of Beown Mountain (2,468 ft.), July 22.

T. fera, Linn. (*Echinomyia fera*, Verrall's List).—Kenmare, June 27 and July 10; Cloonee, July 3; Parknasilla, July 12. Not common. These Irish specimens are not quite typical, having darkened femora, &c.

Plagia curvinervis, Zett.—Glengariff, June 23; Kenmare, Sep. 1.

Thryptocera sp. inc.—Caragh Lake, Aug. 31. The following is Mr. Austen's note on this specimen:—"Not *crassicornis*, Mg., since the 3rd joints of the antennæ are too narrow, and the pollinose bands on the abdomen far too broad. The latter character also prevents its being *T. pilipennis*, Fln., according to Fallen's own description. I have worked through every species mentioned by Schiner, and cannot identify it.—E.E.A."

Siphona geniculata, Deg.—Parknasilla, female, July 18; Waterville, female, Aug. 3.

S. sp. inc. (? *melanocera*, Rob. Desv.)—Parknasilla, male, July 13; Waterville, female, Aug. 3.

Gymnosoma rotundatum, Linn.—Glengariff, June 18, 20, and 23; Kenmare, Sept. 1 (at Scabious blossom near Drumnassig Bridge.)

Kunckel d'Herculais and others have bred this fly from the imago of the Hemipteron *Pentatoma dissimilis* (= *Palomena prasina*, Linn.). After reading Kunckel d'Herculais' account (*Trans. Soc. Ent. Fr.*, 5^{me} ser., ix., 1879, p. 349, *et. seq.*), I enquired of Mr. Distant whether *Palomena prasina* was to be found among the Rhyncota taken at Glengariff, and on receiving an answer to the affirmative I examined the specimens, and immediately recognised it as a bug I had swept in the wet ground near Glengariff Castle at the same time as I swept *G. rotundatum*. A *post-mortem* was held on all the specimens of *P. prasina*, but no sign of a parasitic larva could be found in any of them.

Allophora obesa, Fab. — Parknasilla, July 18; Caragh Lake, Aug. 13 and 20. Rare. A few specimens at chamomile flowers.

Sarcophaga carnaria, Linn.—Darrynane, female, July 31.

S. nigriventris, Meig.—Dooks (Glenbeigh), Aug. 15; Waterville, July 26.

S. sp. inc.—Darrynane, July 31.

S. hæmorrhœa, Meig. — Kenmare, male, June 28.

S. sp. inc.—Glenbeigh, Aug. 17; Waterville, Aug. 2.

Mitogramma punctata, Meig.—Darrynane, July 31; Staigue Fort, July 19; Valencia Island, Aug. 10; Loo Bridge, Aug. 24; Waterville, July 27. Common wherever sand-hills occur, either sitting on the sand or on the flowers of the Ragwort. I frequently watched these flies "shadowing" bees of the genus *Colletes*, and in England the fly is well known to be a parasite on *Colletes succinata*; in Ireland, however, I suspect some other species of this genus will prove to be the host.

Metopla campestris, Fall.—Glengariff, June 12; Kenmare, July 10; Parknasilla, July 21.

Dexlosoma caninum, Fab.—Glengariff, June 12 and 15; Parknasilla, July 11 and 24; Caragh Lake, Aug. 14. Common.

Prosenia siberita, Fab.—Darrynane, July 31; Waterville, Aug. 2; Caragh Lake, Aug. 13; Glencar, Aug. 16. Common at Ragwort blossom on the sand-hills.

Stomoxys calcitrans, Linn.—Valencia Island, Aug. 7. Apparently not so common, nor so generally distributed as the next species.

Hæmatobia stimulans, Meig.—Parknasilla, July 21; Glengariff, June 23; Staigue Fort, July 19; Waterville, Aug. 3; Kenmare, July 10. Very common.

Graphomyia maculata, Scop.—Glengariff, June 15; Kenmare, June 28. Common everywhere.

Mesembrina meridiana, Linn.—Glengariff, June 17. Common everywhere, although only one specimen has been brought away.

Lucilia cæsar, Linn.—Valencia Island, Aug. 7. Probably common.

No specimens have been brought away of several common Muscidae —e.g., *Musca domestica*, *Calliphora vomitoria*, *Pollenia rudis*, *Onesia sepulchralis*, &c., &c.

CESTRIDÆ.

Gastrophilus equi, Fab.—Caragh Lake, female, Aug. 13. Although only one specimen was taken, the number of eggs seen on the shoulders, knees, &c., of horses running loose at Waterville showed that the species was about in some numbers.

ANTHOMYIDÆ.

Polietes lardaria, Fab.—Although no specimens of this species have been brought away, it was very much in evidence at Kenmare and Parknasilla, rising in swarms off the horse droppings in the roads.

Hyetodesia incana, Wied.—Parknasilla, July 24; Kenmare, Sept. 1.

Spilogaster notata, Fall.—Waterville, July 30.

S. communis, Desv.—Dooks (Glenbeigh), Aug. 15.

S. exsul Zett.?—Darrynane, female, July 31; Waterville, male, July 27; Glenbeigh, male, Aug. 17; Dooks (near Glenbeigh), male, Aug. 15. Probably not uncommon on the sand-hills. These specimens are probably identical with those identified by Mr. Verrall as *S. protuberans* and by Dr. Meade as *Caricea exsul*. As they agree best with the description of *S. exsul*, Zett., that name has been selected. It would be interesting to know the distinctions between the three species, *S. protuberans*, *S. exsul*, and *S. consimilis*.

Spilogaster sp. inc.—Glengariff, June 13.

Hydrotæa dentipes, Fab.—Darrynane, July 31.

H. armipes, Fab.—Waterville, Aug. 2.

Drymla hamata, Fall.—Parknasilla, July 22; Waterville, July 28; Valencia Island, Aug. 7; Kenmare, Aug. 27; Loo Bridge, Aug. 28. Very common.

Hylemyla strigosa, Fab.—Waterville, both sexes, Aug. 4; Kenmare, male, June 26. The following is Mr. Austen's note on these specimens:—"The male specimens seem to represent a variety or local race, since the front tibiæ are black except at the base, and the middle tibiæ are black at the extreme tip —E. E. A., Nov. 2."

H. sp. inc.—Waterville, male, Aug. 1.

Chortophila arenosa, Zett.—Waterville, July 30; Dooks (Glenbeigh), Aug. 15; Waterville, female?, July 26; Glenbeigh, female?, Aug. 17. Probably common on the sand-hills; the females are located here with some doubt. According to Meade the species should stand under the genus *Phorbia*.

Phorbia floccosa, Macq.—Staigue Fort, July 19.

P. discreta, Meig.—Parknasilla, July 24.

P. trichodactyla, Rond.—Staigue Fort, July 19.

Pegomyia bicolor, Wied.—Glengariff, male, June 16; Loo Bridge, female, June 28; Waterville, male, July 28; Waterville, female, Aug. 3.

Homalomyia manicata, Meig.—Caragh Lake, male, Aug. 20.

H. canicularis, Linn.—Valencia Island, Aug. 11.

Carlcea tigrina, Fab.—Glengariff, Ardgroom, Kenmare, Loo Bridge, Waterville, Valencia Island. Generally common.

Cœnosia albicornis, Meig.—Glencar, Aug. 16. An addition to the British List.

C. verna, Fab.—Ardgroom, July 20; Kenmare, Aug. 23; Glengariff, female, June 14. In italics in Verrall's List.

Hoplogaster mollicula, Fall.—Parknasilla, female, July 17.

Fucellia maritima, Hal.—Glengariff, Waterville, Staigue Fort, Valencia Island. Very common on the sea coast. *F. marina*, Macq., is a synonym for this species, but no attempt has been made to ascertain which name has priority. Becker's location of this genus in the *Anthomyiæ* is now generally accepted.

A few specimens (chiefly females) still remain undetermined in this family, but it is not worth while wasting more time over them.

CORDYLURIDÆ.

Cordylura pudica, Meig.—Loo Bridge, both sexes, Aug. 24 and 28. Met with in one spot only, but there fairly common.

Trichopalpus punctipes, Meig.—Glencar, both sexes, Aug. 16. A few specimens in clumps of *Carex* on the banks of the Caragh River.

Scatophaga analls, Meig.—Glengariff, June 12, 17, and 18; Loo Bridge, Aug. 28. Not common.

S. scybalaria, Linn.—Kenmare, Loo Bridge, Ardgroom, Waterville. Common.

S. suilla, Fab.—Glengariff, June 12; Waterville, July 28; Glencar, Aug. 16. Not common.

S. inquinata, Meig.—Glengariff, June 12; Parknasilla, July 24. Uncommon.

S. stercoraria, Linn.—Dooks, near Glenbeigh, male, Aug. 15. An unusually bright specimen. Waterville, female, July 26. Probably common.

S. merdaria, Fab.—Waterville, July 26. Probably common.

S. litorea, Fall.—Glengariff, Kenmare, Cloonee, Parknasilla, Waterville, Caragh Lake, Glencar. Common all along the coast, sometimes strays some distance inland, *e.g.*, Glencar and Clonee (Upper Lake).

S. squalida, Meig.—Waterville, Aug. 3. Probably common.

S. dalmatica, Beck?—Glengariff, June 14. This species is probably the same as *S. decipiens* of Haliday, and may be the same as *S. fluvialis*, Rnd.

Ceratinostoma ostiorum, Hal.—Glengariff and Kenmare, but probably common all round the coast.

PHYCODROMIDÆ.

Orygma luctuosum, Meig.—Kenmare, June 26. Staigue Fort, July 14; Waterville, July 27. Common on the sea shore under marine, rejectimenta.

Phycodroma fucorum, Zett.—Glenbeigh, Aug. 17.

Ædoporea buccata, Fallen—Waterville, July 26. Only specimen, though it ought to be common on the sand hills.

***Cœlopa gravis*, Hal. ?**—Waterville, July 27; Glengariff, June 20; Glenbeigh, Aug. 17. Common under marine rejectamenta. A specimen taken at Loo Bridge, June 29, seems to have got off its beat. This genus requires thorough overhauling. A long series will probably show a complete gradation without break from the large form *C. gravis*, Hal., through *C. frigida*, Fall., to the small form *C. parvula*, Hal., in which case all the forms will have to stand under the name of *Cœlopa frigida* of Fallen. Further, Mr. Collin informs me that the generic name *Cœlopa* will probably have to be restricted to *C. pilipes*, Hal., while *C. frigida* and its varieties will have to stand in the genus *Fucomyia*.

HELOMYZIDÆ.

***Helomyza rufa*, Meig.**—Parknasilla, July 17 and 21; Caragh Lake, Aug. 13; Valencia Island, Aug. 20. This species (*H. variegata* of Verrall's List) is not uncommon on decaying fungi.

***H. pectoralis*, Loew**—Valencia Island, Aug. 9. The only specimen.

***H. Zetterstedti*, Loew**—Parknasilla, July 21; Waterville, Aug. 4

Blepharoptera sp. inc.—Kenmare, June 26. Two specimens given to Mr. Verrall as indecipherable. Apart from the natural difficulties attached to the genus, these specimens had suffered much from grease.

***Tephrochlamys rufiventris*, Meig.**—Glengariff, June 12.

SCIOMYZIDÆ.

***Actora æstuum*, Meig.**—Darrynane, July 31. Probably common on all sandy shores.

***Dryomyza anilis*, Fall.**—Parknasilla, July 17. Apparently uncommon.

***D. flaveola*, Fab.**—Glengariff, June 12 and 24. Uncommon.

***Sciomyza albocostata*, Fall.**—Glengariff, both sexes, June 12, 15, and 18. Rare. Waterville, Aug. 3.

***S. cinerella*, Fall.**—Kenmare, June 27; Darrynane, July 31; Waterville, July 27. Rare.

***S. Schœnherri*, Fall.**—Glencar, Aug. 16; Loo Bridge, Aug. 28. Uncommon.

***S. pallida*, Fall.** (*Renocera*, Hendel.) Parknasilla, July 24; Kenmare, Sept. 1. Rare. These two specimens undoubtedly belong to the species which we in England are accustomed to call *S. pallida*, Fallen, but it is equally certain that they belong to *Renocera sintenisiana*, Hendel (*Verh. Z.-b. Gesell. Wien*, Band 1, p. 347, 1900). *Renocera* seems to be a good genus, linking *Sciomyza* with *Tetanocera* through *T. unicolor*. It would be interesting, however, to know in what way, if any, the insects we know in England as *S. pallida* and *S. fuscinervis*, Zett., differ from *R. sintenisiana* and *R. strobli*. Our English insects appear to be correctly identified, and the former is (in England at any rate) so common, that any doubt about its correct identification appears to be impossible.

- Tetanocera elata**, Fab.—Glengariff, June 12, 14, and 15; Ardgroom, July 20; Kenmare, June 27; Parknasilla, July 12; Waterville, July 28. Common.
- T. lævifrons**, Loew—Glengariff, June 12 to 21; Parknasilla, July 13 and 17. Very common at Glengariff.
- T. ferruginea**, Fall.—Loo Bridge, both sexes, June 29; Ardgroom, July 20; Waterville, July 26; Caragh Lake, Aug. 13; Glencar, Aug. 16. Apparently uncommon.
- T. robusta**, Loew—Glengariff, both sexes, June 12; Loo Bridge, July 6. Rare.
- T. coryleti**, Scop. (*Pherbina coryleti*, Hendel).—Kenmare, July 2; Loo Bridge, June 29; Parknasilla, July 14; Waterville, July 30 and Aug. 3; Caragh Lake, Aug. 14; Glencar, Aug. 16. Common, and generally distributed, though it was not taken at Glengariff. This species is the *T. reticulata* of Verrall's List, but should, *apud* Hendel (*Verh. Z.-b. Gesell. Wien*, Band 1, p. 347, 1900), stand under the head of *T. coryleti*, Scop.—the *T. coryleti* of Verrall's List being probably *T. charophyllii*, Fab. (*Lunigera charophyllii*, Hendel), a doubtfully British species.
- T. umbrarum**, Linn. (*Monochætophora umbrarum*, Hendel).—Kenmare, July 2; Parknasilla, July 17; Ardgroom, July 20; Waterville, Aug. 13. Not common.
- T. punctulata**, Scop. (*Trypetoptera punctulata*, Hendel).—Glengariff, June 19; Kenmare, June 28; Parknasilla, July 12. Uncommon.
- T. unicolor**, Loew—Cloonee, July 3. Only specimen.
- In the *Tetanocerinae* four genera (*Tetanocera*, *Limnia*, *Elgiva*, and *Sepedon*) have heretofore been considered sufficient, but should we decide to follow Hendel (*Verh. k.-k. Zool.-bot. Gesell. Wien*, 1900, Band 1, p. 319, and *Term. Fuz.*, xxiv, 1901, p. 138) we shall require twelve genera or sub-genera. Whether in our present knowledge of the Diptera of the world this splitting up is advisable is a matter in which there is room for considerable difference of opinion. Many of these genera are monotypical, and some of the names, *e.g.*, *Renocera*, do not seem to have been happily formed.
- Limnia unguicornis**, Scop.—Glengariff, June 14 and 15; Cloonee, July 3; Kenmare, June 30, July 7, and Aug. 23; Loo Bridge, June 29. Not common.
- Elgiva albiseta**, Scop.—Glengariff, Kenmare, Loo Bridge, Parknasilla, Waterville, Glencar. Common, and generally distributed.
- E. lineata**, Fall.—Glengariff, June 12; Cloonee, July 3; Kenmare, July 2; Parknasilla, July 12 to 24; Waterville, July 28; Glencar, Aug. 16. Common, and generally distributed.
- E. dorsalis**, Fab. (*Hydromyza dorsalis*, Hendel).—Glengariff, June 13 and 20; Kenmare, June 30 and July 2. Rare. A male taken at Kenmare, June 30, had three immature ticks attached to the thorax, near the base of the wings.

PSILIDÆ.

- Psila debilis**, Egg.—Glengariff, June 23. Only specimen.
Chyllza leptogaster, Panz.—Glengariff, June 12 and 24. Not uncommon; running up and down on the trunks of ash trees.
Loxocera aristata, Panz.—Cloonee, July 3; Waterville, July 28; Caragh Lake, Aug. 13. Not common.
L. albiseta, Schrk.—Parknasilla, July 13 and 24; Loo Bridge, Aug. 28. As a rule not common, though it occurred in some numbers at Parknasilla on the 24th July.

ORTALIDÆ.

- Pteropæctrla frondescentiæ**, Linn.—Glengariff, June 14; Kenmare, June 28; Parknasilla, July 12; Waterville, July 28.
Rivellia syngenesiæ, Fab.—Kenmare, June 26.

TRYPETIDÆ.

- Trypeta onotrophes**, Loew.—Glengariff, June 20. On this occasion in numbers. Kenmare, June 28, male and female (*in coitu*).
T. florescentiæ, Linn.—Glengariff, June 20. A single specimen in company with the preceding species.
Acidla heraclei, Linn.—Parknasilla, July 13. Only specimen.
Tephritis miliaria, Schrk.—Glengariff, June 12; Kenmare, July 2. Probably common, though only a few specimens have been brought away.
T. conura, Loew.—Glengariff, June 12; Kenmare, June 26.
T. vespertina, Loew.—Waterville, Aug. 2 and 3; Kenmare, Sept. 1.
Euaresta conjuncta, Loew.—Glencar, male, Aug. 26; Glenbeigh, female, Aug. 17.

SAPROMYZIDÆ.

- Peplomyza Wiedemannii**, Loew.—Glengariff, June 12, 18, and 23; Parknasilla, July 12 and 21.
Sapromyza longipennis, Fab.—Glengariff, June 14. Only specimen.
S. lupulina, Fab.—Glengariff, June 12; Loo Bridge, Aug. 24.
S. fasciata, Fall.—Kenmare, June 26.
S. sp. Inc. (near *intonsa*).—Valencia Island, Aug. 9.
S. sp. Inc.—Waterville, July 26, 27, and 30; Glenbeigh, Aug. 17. Common in the coarse grass; growing on the sand-hills.
S. inusta, Meig.—Glengariff, June 12 to 23; Parknasilla, July 15 to 17; Caragh Lake, Aug. 14 to 20. Common.
S. sexpunctata, Meig.—Stague Fort, July 19. Not in Verrall's List.
S. porida, Fall.—Waterville, Aug. 4; Glengariff, June 15.
S. sp. Inc. Glengariff, June 18.

HETERONEURIDÆ.

Stomphastica flava, Meig.—Waterville, Aug. 4. On decaying fungus, only two specimens.

OPOMYZIDÆ.

Opomyza germinationis, Linn.—Glengariff, June 12; Kenmare, June 26; Parknasilla, July 17.

SEPSIDÆ.

Sepsis punctum, Fab.—Glencar, Aug. 16; Loo Bridge, Aug. 28.

S. violacea, Meig.—Kenmare, June 26.

S. cynipsea, Linn.—Glengariff, June 12.

Nemopoda cylindrica, Fab.—Glengariff, June 15; Kenmare, June 28, Aug. 22, Sept. 1.

GEOMYZIDÆ.

Diastata nebulosa, Fall.—Glengariff, June 12. The only specimen.

EPHYDRIDÆ.

Ochthera mantis, Deg.—Glengariff, June 21; Parknasilla, July 17; Loo Bridge, June 29; Glencar, Aug. 16. Probably more common than these dates appear to indicate.

Parhydra coarctata, Fall.—Kenmare, Aug. 26. Probably common.

Notiphila uliginosa, Hal.—Glengariff, females, June 21.

N. annulipes, Stenh.—Parknasilla, male and female (*in coitu*), July 13.

N. cinerea, Fall.—Glengariff, June 21; Waterville, July 26; Darrynane, July 31.

CHLOROPIDÆ.

Meromyza pratorum, Meig.—Waterville, July 27 and 30. Common.

M. saltatrix, Linn.—Waterville, July 27.

Centor myoplus, Loew—Kenmare, June 30; Caragh Lake, Aug. 13.

AGROMYZIDÆ.

Agromyza sp. inc.—Waterville, July 27.

A. capitata, Zett.—Kenmare, July 2. Not in Verrall's List.

Ochthiphila flavipalpis, Hal.—Waterville, July 26. Common on the sand hills. This species appears in Verrall's List as *O. maritima* (Dufour).

PHORIDÆ.

Phora crassicornis, Meig.—Kenmare, Aug. 23. A singleton.

The Irish Diptera to be found in the British Museum collection are so few that it seems worth while to record them here.

INCORPORATED IN THE COLLECTION.

Tipula gigantea, Schrk.—Leenane (Co. Galway), July 14, 1892 (Austen).

Sargus iridatus, Scop.—Roscrea (Co. Tipperary), June 23, 1895 (Gahan).

Theriopteles montanus, Meig.—Leenane, July 14, 1892, and Lough Conn (Co. Mayo), July 27, 1892 (Austen).

Chrysops rellictus, Meig.—Leenane, July 14, 1892 (Austen).

Leptis scolopacea, Linn.—Leenane, July 14, 1892 (Austen).

Chilosia illustrata, Harris—Lough Conn, July 27, 1892 (Austen).

This specimen does not belong to the bright Kerry form.

Pyrophæna granditarsa, Forster.—Loughrea (Co. Galway), Sep. 20, 1893 (Gahan).

Eristalis pertinax, Scop.—Leenane, July 14, 1892 (Austen).

Scatophaga stercoraria, Linn.—Roscrea, June, 1895 (Gahan).

Ædoparea buccata, Fall.—Waterville (Co. Kerry), Dec. 20, 1893 (Yerbury).

Pteropæctria frondescentiæ, Linn.—Roscrea, June 26, 1895 (Gahan).

Tephritis elongatula, Loew—Kilmore (Co. Wexford), Aug. 13, 1898 (Beaumont).

Tephritis sp. inc.—Kilmore, Aug. 13, 1898 (Beaumont).

Opomyza germinationis, Linn.—Leenane, July 14, 1892 (Austen); Roscrea, June, 1895 (Gahan).

Ornithomyia avicularia, Linn.—Wicklow (Red Grouse), from the Editor of *The Field*.

Among the unincorporated accessions are the following collected by Mr. Gahan at Roscrea, Co. Tipperary, and Loughrea, Co. Galway, during June, 1895:—

Empis tessellata, Fab.

Dolichopidæ sp. inc.

Pipizella sp.

Platychirus manicatus, Meig.

Xanthandrus comtus, Harris.

Syrphus ribesii, Linn.

S. luniger, Meig.

Sphaerophoria menthastri, Linn.

Volucella pellucens, Linn.

Eristalis tenax, Linn.

E. arbustorum, Linn.

E. pertinax, Linn.

Helophlius pendulus, Linn.

Sericomyia borealis, Fall.

Sarcophaga carnaria, Linn.

Calliphora vomitoria, Linn.

Anthomyidæ, four sp. inc.

And some indeterminable *Acalyptrates*, in bad condition.

THE NESTING HABITS OF VESPA RUFA.

BY DENIS R. PACK-BERESFORD, D.L.

IN his book on "British Social Wasps," Dr. Ormerod remarks on the fact, that *V. rufa*, though a ground-building species, yet builds her nest on what he calls the "laminar" plan, like the tree-building species *V. sylvestris* and *V. norvegica*, as opposed to the "cellular" plan of the nests of *V. vulgaris* and *V. germanica*, the two other ground-building species.

Besides the plan, the texture of the outer case of *V. rufa* nests is very distinct, being tough and paper-like as in those of the tree-building species; whereas that of the other ground-builders is extremely brittle. In fact, the nest of *V. rufa*, although built on the ground, decidedly resembles the tree nests in size and general structure. Another point of interest that I noticed in nests of *V. rufa*, which I found last summer was, that although built on the ground they were not in any sense underground, but were suspended from the roots of long coarse grass, with no earth over them, but sitting into a cup-shaped hollow in the earth, which had evidently been excavated by the wasps for their reception.

I succeeded in finding three such nests last summer, and all were similarly situated.

Mr. Carpenter has been so kind as to examine for me a *V. rufa* nest from Co. Tipperary, which is in the Museum in Dublin; and he tells me that pieces of grass roots and stems run through the upper surface of the nest, showing that it too must have been built in the same sort of place.

One more case. Mr. Robson, in his article on *Vespa austriaca* in *Science Gossip* (vol. v., p. 69), describes a *V. rufa* nest in a hay-field. He says, "The nest was attached to the very abundant fibrous roots of the grasses at the summit"; and further on, "So firmly was the nest secured to the roots on the inner side in its upper part, that the walls there were torn away when it was carefully drawn out of its cavity."

It seems probable, then, that these nests are as a rule built amongst the roots of grass, and not underground.

Should subsequent observations prove this to be the invariable position of the nests, it would be of great interest, for, taken in conjunction with the general structure of the nests, it would seem to place *V. rufa* in a more or less intermediate position between the ground and tree building species.

Dr. Ormerod further says: "Beyond the fact that *V. rufa* is a ground wasp, I cannot say where its nests are likely to be found. The barrenness of my cabinet is, indeed, proof that I have never looked in the right place for it." Now, I have often wondered why it was that the nests of *V. rufa* are so rarely found, although in the spring the queens of this species are one of the commonest, if not the commonest, of all wasps. After finding these few nests, however, I am more inclined to wonder that the nests are ever found at all.

A field of hay might contain twenty nests without one's being able to find one. The communities are so small one may stand quite close to a nest without knowing it.

Then, again, *V. rufa* seems to be much less irritable than most wasps. One nest I found by chancing to see a worker of *V. rufa* drop into the grass at my feet, and although I pulled away the grass till I laid bare the side of the nest, not a single wasp came out.

Again, I noticed that although, as a rule, the wasps seem to go in and out of the nest through one spot in the grass, they could—and did on emergency—come and go through any part of the grass over the nest. As a result, there was no clearly defined hole of entrance, such as one sees in other ground nests. It is scarcely to be wondered at, then, that *V. rufa* nests are so seldom found, though in reality it is a common wasp enough; but I am in hopes that these few remarks may give other collectors a clue as to where to look for them.

Fenagh House, Bagenalstown.

THE GLACIAL ORIGIN OF GLENDOO.

BY W. B. WRIGHT, B.A.

[Read before the Dublin Naturalists' Field Club, 19 November, 1901, and published by permission of the Director of the Geological Survey.]

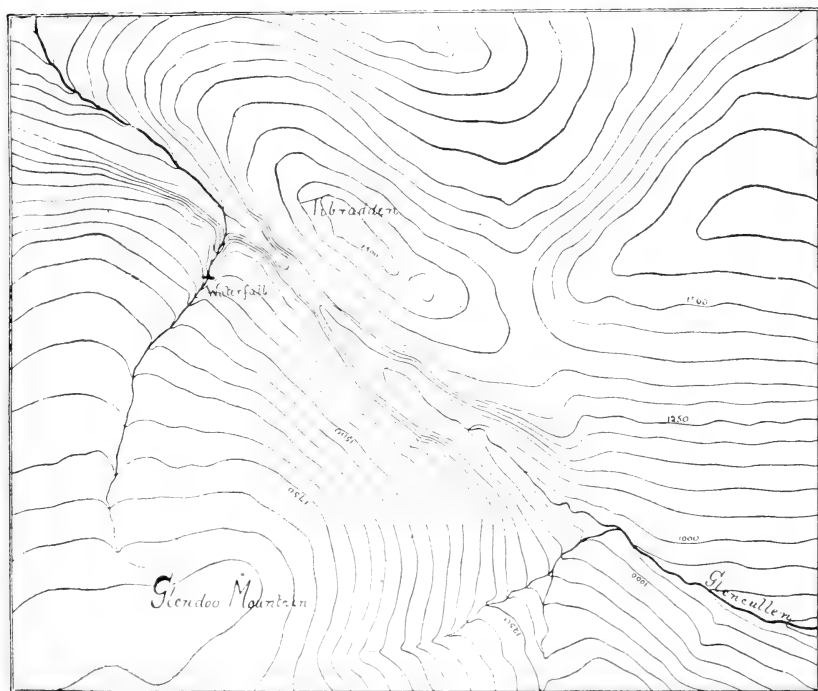
THE glen which is the subject of the present paper ought to be well known to all residents in Dublin who love a good tramp or a day among the hills. It is a steep-sided pass connecting the valleys of Glencruagh and Glencullen. The slopes are densely wooded with larch and fir, and the road winds backwards and forwards over the stream, giving glimpses of the river below rushing over ledges of rock, and plunging into deep brown pools of peat-coloured water. This stream, which adds so much to the beauty of the spot, enters the pass about 200 yards north of the summit, and flows down into Dublin. It has its gathering ground on the slopes of Cruagh and Glendoo Mountains, and attains considerable volume before it emerges laterally into the pass. A much smaller stream pours down the side of the pass at the summit, and at times, especially when in flood, divides, one portion of the water going to the Dublin side of the pass and the other to the Glencullen side. In the year 1868 Professor Hennessy called attention to this exceptional phenomenon of two streams flowing in opposite directions from a common source.¹ He did not, however, attempt to apply this to explain the cutting of the pass; indeed this question does not seem to have presented itself to him at all. This stream, although Professor Hennessy mentions having seen it of considerable volume in flood time, is a mere trickle compared to the lateral stream mentioned above, and it is quite impossible to imagine the pass to have been cut by it, especially as it has no valley outside the pass, but merely pours down its side.

Another fact of importance is that about 150 yards up the lateral stream, from the point where it joins Glendoo, is a waterfall about 12 feet in height, with several smaller falls close above it, which probably at one time formed part of the main fall, but which have separated from it owing to the

¹ *Proc. R. I. A.*, vol. x., p. 335, and vol. i. (2nd series) p. 36.

upper part of the fall being cut back faster than the lower. The total drop of the stream at this point must be 20 feet or more.

In considering the bearing of these facts, it occurred to the writer that the most natural deduction was that the cutting of the pass was due, not to the streams which flow in it at present, but to some other agency which acted before the streams had time to effect any erosion, and that the waterfall up the lateral



stream had been caused originally by its flowing over the edge of the pass, and had since retreated by backward cutting into its present position.

At the close of the Glacial Period such an agency was undoubtedly in existence in the form of the marginal waters of the ice sheet. How the phenomenon takes place has been made very clear by recent observations in Greenland. Cases have been described as of very frequent occurrence, where

the ice has dammed back the waters into some small lateral valley, forming a temporary lake. If there happened to be a col in the range of hills low enough, the waters of the lake would drain over this instead of along the margin of the ice sheet, as in the following illustration;—

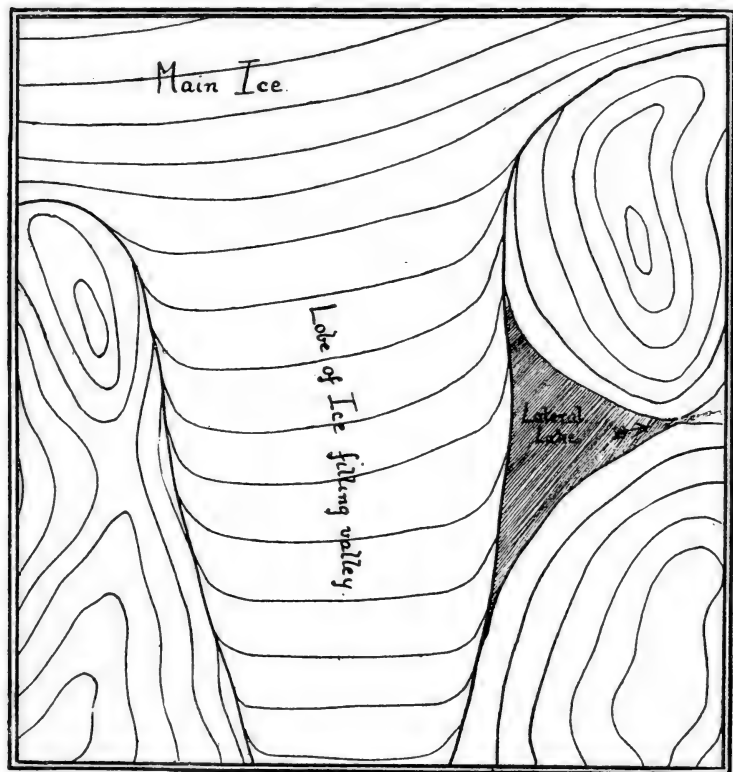


DIAGRAM TO ILLUSTRATE FORMATION OF LATERAL LAKE AND
CONSEQUENT DRAINAGE OVER A COL.

The Marjelen See in Switzerland affords an instance where drainage of this kind actually occurs during portion of the year, and similar phenomena have been explained in a similar way with great success in many parts of England and America.

In the case of the general ice sheet melting away, and leaving bare hills, such as the Dublin Mountains, not high enough to have a local ice-sheet of their own, this

phenomenon would for obvious reasons be far more common. In the first place melting would proceed more rapidly near the margin, owing to the dark-coloured hills absorbing sun-heat better than the ice. The result of this would be that the surface would slope towards the hills, and be lower at the heads of the valleys than at their mouths, and such conditions would clearly hinder drainage along the margin and favour the formation of lakes. Secondly, this slope would tend to make the surface waters drain to the edge of the ice, and would thus give a far more copious supply than could be caused by hill drainage only.

It is, perhaps, advisable to remark here that these lakes would most likely, as a general rule, be very small, and formed mainly in the lesser valleys lateral to the main ones, and it is not intended to imply that such large valleys as Glenasmoel, for instance, were ever filled with an unbroken sheet of ice-dammed waters, though such a thing would be perfectly possible.

The result of such drainage over a col is to cut a steep-sided notch through the ridge, its depth and completeness from end to end depending both on the volume of escaping water and the time during which it was held up by the ice.

Of gaps of this nature across ridges there are in the Dublin Mountains numerous undoubted examples. The fact of their being quite dry, except for a trickle of rain-water from their sides, and in such a position as to preclude the possibility of their being cut under existing drainage conditions, renders their origin almost a matter of certainty.

Such, however, is not the case with the pass of Glendoo, for the lateral stream mentioned above is of sufficient volume to have cut the pass provided it could be supposed to have gone opposite ways at different times.

Before proceeding to discuss the question, it is necessary to point out that it is not the object of the present paper to prove that Glendoo has been entirely cut by ice-dammed waters, but rather to show that the evidence points to the fact that such erosion was instrumental in deepening it. This restriction is necessary because the contour of the hills shows that, even before the present steep-sided gap was cut, there must have been an exceptionally low pass over the hills just here,

and also because the streams flowing in it at present, especially that on the Dublin side, must have since considerably deepened it except at the very summit, where it is comparatively dry.

The explanations which might be advanced to account for the formation of the pass are as follows:—

(1.) That the stream flowed alternately first one way and then the other, the reversals of the drainage being frequent, and caused by some small lateral torrent carrying detritus into the valley during a flood, and so blocking it up temporarily and causing the water to flow down the other way.

To this theory there are two fatal objections. In the first place it offers no definite explanation of the waterfall mentioned above. In the second place the lateral valley, even below the waterfall, is not half the size of Glendoo, and it ought on this supposition to be more nearly twice the size, considering that the erosion has been going on continually in it and only intermittently in each half of the main valley.

(2.) That the large stream originally flowed into Glencullen, and that the smaller, but more steeply graded stream, flowing from the summit of the original pass towards Dublin, cut backwards until it captured the waters of the larger lateral stream which now, as a consequence, flows north.

With regard to this explanation it is hard to see how, at its very head where the flow of water must have been so insignificant, it would be possible for the little stream to cut its valley as deep as that of the adjoining large stream. If, however, this once took place, the large stream might easily, by cutting laterally, break down the final barrier. Also, if at the point of breaking through, the valley of the small stream was 20 or 30 feet lower than that of the large one, the waterfall would also be explained.

It might be urged that, if the head of the smaller valley was more exposed to the beating of wind and rain than the other, the deepening might be effected. The shape of the valley, however, is not such as to suggest erosion of this nature. It is long and narrow and of nearly uniform width and slope of sides, whereas the wind and rain would tend to cause a wide cirque at the head, and to open out the valley lower down and make its slopes gentler.

If this explanation of the waterfall is the true one, we should expect at the point of entrance of the stream a rise in the floor of the pass of some 20 or 30 feet, and there is no evidence of anything of the kind. It is, however, quite possible, and even probable, that the quantity of talus subsequently deposited in a steep-sided valley like this would almost entirely obliterate such a feature.

It would appear therefore that this theory, although quite a possible one, has many difficulties and does not seem to fit the facts at all well.

(3.) The third and remaining explanation is that the pass was cut by the escape of ice-dammed waters flowing from Glencruagh to Glencullen, or, perhaps *vice versa*. According to this theory the waters of the lateral stream (the amount of erosion due to which would be negligible during the comparatively short time in which the pass must have been cut) originally poured over its side as a cascade, which subsequently cut backwards year by year, until it reached its present position about 200 yards up the stream.

This explanation would account for the straightness and uniformity of the pass from end to end better than any other. The fact that the floor of the pass slopes from the summit in both directions might be urged as an objection. This, however, would be caused by the more recent erosion of the streams which flow in either direction from it, and the unchecked accumulation of detritus at the summit.

If it were possible to obtain further proof to confirm the evidence mentioned above as to the glacial theory, a very interesting piece of research would be possible. We might, by sinking wires in the face of the fall, in the manner suggested and carried out at Melbourne by Mr. Brittlebank,¹ and observing the amount worn off every year for a period of about 10 years or so, estimate the rate of retreat of the waterfall. Hence, by measuring accurately the distance to the edge of the pass we could deduce the time taken for the fall to retreat that distance at its present rate. It is, however, proved by the coarseness of the old river gravels and other evidence that, in the period which has elapsed between the close of the Glacial Period and

¹ C. C. Brittlebank. The Rate of Erosion of some River Valleys, *Geol. Mag.*, 1900, 4th Ser., vol. vii, p. 320.

the present day, climatic conditions were in general far severer than now. The result could, therefore, only give a maximum limit for the time since the close of the Glacial Period, but would still be in some degree a test of the astronomical theory. The present state of the evidence as to Glendoo, however, would hardly justify such a troublesome piece of research, but there must be in Ireland other cases of a similar nature, in which the evidence is more definite, and it may be possible at some future time to make such measurements in other places.

Trinity College, Dublin.

NOTES.

BOTANY.

Vegetable Bricks.

Travelling in the extreme west of Mayo, one may see cabins, the walls of which are mainly turf sods; but these cabins are usually partly excavated under ground in some bank. One hardly expects, however, to find peat-bricks (if I may so call them), used in a large town like Belfast. Yet there were jerry-builders in the "good old times," too, for parts of a wall were lately found built with peat, plastered over, in old business premises in High-street, one of the main streets in the city.

R. WELCH.

Belfast.

ZOOLOGY.

New Irish Copepod Crustaceans.

In the *Natural History Transactions of Northumberland, Durham, and Newcastle-on-Tyne*, vol. xiv., 1902, some lists of the littoral Entomostraca of the east coast of Ireland are given by Prof. G. T. Brady. These specimens were collected by him in the autumn of 1900, during a short visit to Ireland, but he also refers to some two net gatherings made on the west coast in previous years.

Among the most noteworthy features in Dr. Brady's paper are the descriptions with figures of two new Irish species. One (*Ameira amphibia*) was taken on a mussel-bed between tide marks at Newcastle, Co. Down, and another (*Laophonte subsalsa*) in brackish pools near Dundrum, Co. Down, and also on the west coast of Donegal. Another addition to the Irish fauna is *Harpactus gracilis*, Claus, which was taken in Roundstone Bay in 1871, but had not previously been recorded.

Cardium norvegicum at Portmarnock.

The heavy gales of the past winter brought this rather rare shell in on Portmarnock strand, in numbers such as I have reason to believe had never been seen before. On January 5 my friend, Robert de V. Shaw, and I collected over 100 full-grown and perfect examples in an hour, and we were not the only collectors. Though the specimens were very fresh, not one contained the animal; and we noted that we saw only three broken examples, and one single valve. Miss Massy, who watches this strand regularly, tells me that on some days she could have collected baskets-full; and that evidence goes to show that for the better part of half a century past old single valves usually represent the species, though at one time very young specimens—little more than fry—were sometimes obtained in quantity. Mr. Hart states that live specimens have been thrown ashore after storms. Fine specimens are still to be obtained, if any collector desires them.

R. LL. PRAEGER.

Whiskered Bat in Co. Wexford.

On the evening of January 21st a male Whiskered Bat was caught at Ballyhyland, by a boy named Walter Carter, who struck it down with a switch as it flew low along the ground. I forwarded it alive to Dr. Alcock, by whom the above identification has been confirmed. This bat is new to the fauna of Wexford, and has hitherto been obtained, so far as I know, in only five Irish counties, viz., Clare, Dublin, Louth, Fermanagh, and Down. The fact of its flying in winter may not have been previously noted. The temperature was 48° Fahrenheit—a high though by no means extraordinary degree of warmth for the time of year.

C. B. MOFFAT.

Ballyhyland, Co. Wexford.

By Mr. Moffat's kindness I have had the opportunity of examining insect fragments from the droppings of this Bat. All seem to be referable to Diptera, and some pieces of legs and wings clearly belong to a small Tipulid—very probably a species of *Trichocera*.

G. H. CARPENTER.

GEOLOGY.**Liassic Brachiopoda.**

It may be interesting to geological readers of the *Irish Naturalist* to know that on the 1st of February, 1902, I found two specimens of the rare Liassic brachiopod, *Discina Holdenis*, Tate, in the zone of *Ammonites angulatus*, of the Lower Lias, at Barney's Point, Island Magee, County Antrim. These little Brachiopoda are not common in our Liassic strata, and this is the only locality in which I have ever found them.

R. BELL.

Belfast.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

We have received the Seventieth Annual Report of the Society giving an account of the work for the year 1901. We regret to see a falling off in the number of visitors (154,444 last year as against 156,012 in 1900), and in the receipts (£2,109 14s. 1d. from all sources as against £2,365 1s. 8d. in 1900); but the Council consider that this falling off is due to "two temporary causes"—the war and the Glasgow Exhibition—and are convinced that "there is no reason for anxiety or even for discouragement." The statement of account shows a debit balance of £224 19s. 1d., which contrasts with the £500 odd balance in hand at the beginning of the year. The most encouraging feature in the financial position of the Society is the increase of over £36 in the receipts at cheap rates of admission as compared with 1900. A large expenditure has been incurred in the completion of the new "Roberts" carnivora house, which will soon be ready to receive its inmates. The house and its inhabitants will together make a goodly show, for "there has never been in the Gardens so large or so fine a stock of Lions as at present"; two litters of three cubs each were born during 1901 (by "Cæsar" of "Stella," on June 8th, and by "Cæsar" of "Lady Macbeth," on September 12th), but two of "Stella's" family have not survived. Among the specially noteworthy acquisitions are the large Chacma Baboon brought from South Africa by the North Cork Rifles, the Indian Swine from the Royal herd at Windsor, and two Chimpanzees and a Sea Lion (purchased). Unfortunately several valuable animals have died. The fine Lioness "Germania" succumbed to sudden peritonitis, due to an unexplained rupture of the stomach; the Bactrian Camel and her calf both died from some unknown cause; the female Chimpanzee, like so many of her race, contracted phthisis. The Report is adorned with several excellent photographs.

Together with the Report the Council issues an interesting and valuable booklet by Professor Cunningham on the "Origin and Early History" of the Society. Despite several gaps in the official records, due to the loss of documents through the repeatedly changing honorary secretariat, the author has produced a fairly connected history of the Society, and deserves the hearty gratitude of Irish zoologists for his labour of love. The Society was founded at a public meeting held in the Rotunda on May 10th, 1830, and one of the leaders in the new undertaking was the great surgeon, Sir Philip Crampton, who was the first President (in 1833), and was six times subsequently re-elected to that position of honour. Dr. Whitley Stokes was the first secretary, but he resigned when, in 1833, the constitution of the Society was modified and improved. Professor Cunningham has taken pains to trace the origin of the famous Saturday breakfasts, and concludes that they began regularly in 1835, though Morrison's Hotel was at first the rendezvous, the custom of meeting at the Gardens not being adopted until several years later.

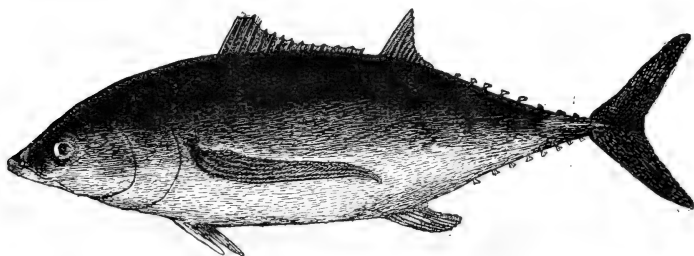
THE LONG-FINNED TUNNY,

THYNNUS GERMO (LACEP.)

AN ADDITION TO THE IRISH FAUNA.

BY R. F. SCHARFF, PH.D.

LAST autumn Mr. Otway noticed a large fish struggling in shallow water on the coast of Wexford. He secured it and sent it to Dublin to be stuffed. When I mentioned to him that it was *Thynnus germo*, a species not hitherto represented in the Dublin Museum, he at once presented it to our National Collection. It is, however, not only new to the Museum, but also an addition to the Irish Fauna, since it has not been noticed before in Irish waters. It measured 2 feet 7 inches from the tip of the snout to the fork of the tail fin, while the pectoral or breast fins were 11 inches long. It is dark blue above, and silvery white below. In order to give a better idea of the species, I herewith give an outline figure taken from a sketch of the fish.



It is at once recognised as distinct from the Common Tunny by the long pectoral fins, which are quite short in comparison in the latter species.

The Long-finned Tunny, like the other, is a Mediterranean fish, whose range extends to the Atlantic coasts, but it is much the rarer of the two. It has only been taken two or three times on the south-west coast of England. Its flesh resembles that of the Common Tunny, but it is not considered such a delicacy in the countries where it is much eaten, as in France and Italy.

Science and Art Museum, Dublin.

SOME PROBLEMS OF IRISH ENTOMOLOGY.

BY H. K. GORE CUTHBERT.

I HAVE used the word "Irish" in the heading of this paper, not because the subjects discussed have any special application to Ireland, but because I think we have a fair number of Irish naturalists whose attention I would like to direct to such things, as a help towards their solution.

Notwithstanding all that has been done by competent observers in recent years, there is still a large field for inquiry in insect economy, notably in the mutual relations of different species in the same or different groups. I may instance the researches in which I was engaged some years ago in order to establish the true position of the remarkable wasp *Vespa austriaca*. Up to last summer it seemed to be a fair conclusion that this wasp was an inquiline, or messmate, in the nests of *Vespa rufa*. Last August, however, Mr. Pack Beresford's discovery of the males of *austriaca* in large numbers at one spot in County Carlow lead us to assume the view that the insect is nothing more than a variety of *rufa*; and a careful comparison of the male characters (special sex organs) of *austriaca* with those of the typical *rufa* is all we now need to clear up this point. I hope Mr. Beresford may be able to do this for us next summer.

In this country none of our social wasps' nests appear to have been ever systematically examined for other than their lawful inmates. The curious beetle *Rhipiphorus* (*Metacus*) *paradoxus* is found in most parts of England and the Continent living in the nests of *Vespa vulgaris* and *V. rufa*. An Irish example of this beetle has never been recorded, but there is no reason why it may not occur here, in the southern counties at least.

There are some other branches of this class of inquiry to which I would invite our entomologists' attention. The nests of the Heteroptera (Ants) might be examined wherever found for the very curious and interesting beetles of certain families (*Atemeles*, *Claviger*, &c.) known to be parasitic on certain genera. Also, some search might be made for the truly inquiline ants; for instance, *Formicoxenus* and *Stenammas*,

messmates of the well-known and locally abundant Wood Ant, *Formica rufa*, have not yet been taken in Ireland.

Further detailed observations are needed to establish some facts concerning other inquiline Hymenoptera, such as whether a particular species by preference associates with one or with various hosts. Among the *Pompilidæ*, *Ceropales maculata* is undoubtedly inquiline upon *Pompilus plumbeus*, and probably other *Pompili*. It is common in many parts of Ireland, inland as well as maritime. Certain species of *Nomada* appear to be always attached to certain *Andrenæ*, but the majority seem rather promiscuous in their preferences. *N. ferruginata* is stated by Smith and others to be a messmate of *Andrena humilis*. I have taken the former in County Dublin; the latter is not yet recorded as Irish. We know that most of the *Nomadæ* associate with more than one *Andrena* host, and *ferruginata* is probably not confined to *humilis* alone.

The very peculiar and pretty solitary bee *Epeolus*, of which one species, *E. productus*, is fairly common throughout England, is a messmate of *Colletes succincta*, *C. picistigma*, and *C. daviesana*. The latter bees are common enough in Ireland, but an Irish naturalist has yet to discover *Epeolus*.

I would like also to direct our entomologists' attention to the abundant genus *Sphecodes*, of which there are six species on our list, and which, according to Mr. Edward Saunders, is probably inquiline either upon certain genera of *Halictus* or *Andrena*, or both.

The working out of life-histories is a branch of science well worth the attention of any naturalist with the necessary leisure. The Irish Diptera, until the recent publication in this magazine of Col. Yerbury's Kerry list, had been practically neglected since Haliday's time. But Haliday's work on this order was very thorough, and it is a pity that the results of his labours, scattered through many scientific periodicals, reviews, and transactions, have never been edited in a form useful and accessible to present-day students.

The investigation of the habits and history of those Diptera with aquatic larvæ is of much interest in view of the connection between certain of the mosquito family and the origin of malaria, and I would refer every student

interested in the classics of this study to the monographs, published some years ago, of Prof. Weissman on *Corethra plumicornis*, and of Prof. Miall on *Chironomus dorsalis*. There is much yet to be known about our Diptera, although the order, as a whole, has been well worked out in recent years by foreign specialists, and it is unfortunately not an attractive one to the mere collector.

Nevertheless, entomologists who are collectors and nothing more will do well to remember there is much work yet to be done in compiling Irish records. The non-aculeate Hymenoptera, Ichneumons, Saw-flies, Gall-flies, &c., still need systematic local work; and one of the great charms of the study of new ground like this lies, to the pioneer, in the fact that once a beginning with a published list is made, however small, every addition becomes a new record, and a sure foundation is laid for subsequent workers.

Dublin.

RHYNCHOTA COLLECTED BY COL. YERBURY IN SOUTH-WEST IRELAND (1901).

BY W. L. DISTANT.

COL. YERBURY has added considerably to our knowledge of the Irish insect fauna, by his recent entomological visit to Kerry. The following is a list of the Rhynchotal species which he then collected, and has since kindly placed in my collection:—

HETEROPTERA.

PENTATOMIDÆ.

Eurygaster maura, Linn.—Caragh Lake.

Palomena prasina, Linn.—Glengariff.

Dolycoris baccarum, Linn.—Caragh Lake, Glengariff, Waterville.

Tropicoris rufipes, Linn.—Caragh Lake, Parknasilla.

Acanthosoma hæmorrhoidale, Linn.—Glengariff.

A. dentatum, de Geer.—Glengariff.

Elasmotethus Interstinctum, Linn.—Glengariff.

COREIDÆ.

Syromastes marginatus, Linn.—Caragh Lake, Glengariff, Waterville.

LYGÆIDÆ.

Pamera fracticollis, Schill.—Glengariff.

CAPSIDÆ.

Miris lævigatus, Linn.—Glengariff.

M. calcaratus, Fall.—Glengariff.

Leptopterna ferrugata, Fall.

Calocoris roseo-maculatus, de Geer.—Waterville, Parknasilla.

Rhopalotomus ater, Linn.

Lygus pratensis, Fabr., var. **campestris**, Fabr.—Caragh Lake.

Cyllocoris histrionicus, Linn.—Glengariff.

Harpocera thoracica, Fall.—Caragh Lake.

SALDIDÆ.

Salda littoralis, Linn.

REDUVIIDÆ.

Nabis rugosus, Linn.

HYDROMETRIDÆ.

Hydrometra stagnorum, Linn.—Caragh Lake.

Gerris najas, de Geer.—Caragh Lake.

G. odontogaster, Zett.—Waterville.

NOTONECTIDÆ.

Notonecta glauca, Fabr., var. **maculata**, Fabr.—Waterville.

HOMOPTERA.

CIXIIDÆ.

Cixius nervosus, Linn.—Glengariff.

C. pilosus, Ol.—Glengariff.

CERCOPIDÆ.

Aphrophora alni, Fall.—Waterville, Parknasilla, Glengariff.

Philænus spumarius, Linn.—Caragh Lake, Waterville, Parknasilla.

P. lineatus, Linn.—Parknasilla.

TETTIGONIDÆ.

Tettigonia viridis, Linn.—Caragh Lake, Waterville, Parknasilla.

South Norwood, London.

STUDIES IN IRISH ENCHYTRÆIDS.

BY THE REV. HILDERIC FRIEND.

THROUGH the kindness of Mr. Carpenter I am able to add somewhat to our knowledge of indigenous white worms (Enchytræids), and at the same time propound a new theory based on the material supplied.

I.—THE ASTER WORM.

On January 28th, 1902, I received some material from Mr. Carpenter, consisting of decaying celery leaves infested with a pest. It had been sent to him from a garden at Monkstown, Co. Dublin.

A pocket lens at once revealed the presence of a destructive and well-known white worm (*Enchytræus parvulus*, Friend), and with it another species, about which I shall have something further to say later on. The first species (*parvulus*) has been known in England since July, 1897, when I discovered it in the vicinity of Birmingham, doing immense harm among the Asters. I thereupon named it the Aster Worm, and soon had specimens of sick Asters, suffering from the same pest, from many parts of the country. Then it was found among tulips (as in the Botanical Gardens, Cambridge), fritillaries (in the Royal Gardens, Kew), and finally in celery at my own residence near Birmingham. As the description which I then drew up¹ holds good for the specimens from Ireland, I shall here content myself with repeating my own definition.

“Aster Worm: *Enchytræus parvulus*, Friend.

“The worm is 3 to 5 mm. in length, or about an eighth of an inch. It is therefore the smallest species known to science, since Tauber's *E. minutus* is insufficiently described, and cannot be certainly identified. Viewed under a pocket lens it is white or silvery, and when seen under a microscope the first six or seven segments are pellucid, while the remainder of the worm's intestinal organs are covered with dark cells. The character by which it may be most readily

¹ Vide *Gardeners' Chronicle*, August 14th, 1897, p. 97.

distinguished by the microscopist who is not a specialist in worms, is the number and arrangement of the setæ. As in other oligochaets, there is an entire absence of setæ, or bristles, on the first segment; while on the twelfth, which bears the girdle or clitellum and the male pores, the ventral bundles are missing. All the other segments, of which there are about thirty in an adult worm, bear four bundles of setæ, of which two bundles are lateral and two ventral. In the first eighteen segments, or thereabouts, there are three setæ in each ventral bundle and two in each lateral; but in the last ten or twelve segments each bundle, ventral and lateral alike, has three setæ. Thus the bundles are all either couples or triplets, and the order and arrangement are definite, not irregular or promiscuous. There is a large head-pore between the prostomium and the first ring—*i.e.*, the one without setæ, and when a little pressure rests upon the worm's body the fluid and particles contained within the coelomic cavity and head are poured out of this aperture, thus relieving the pressure. The brain is somewhat pear-shaped, rounded off, or convex at the hinder margin, and there is a slight tendency on the part of the ventral nerve-cord to broaden between the third and fourth segments. The blood-vessels and other parts are of the usual type; the girdle is slightly papillose, and accompanying the pores on the twelfth segment are somewhat large, vase-shaped glands."

The Irish material has not been sufficient to afford me any new features. The worm comes very near to, if it be not identical with, Dr. Michaelsen's *E. argenteus*, which he found on the shores of the Elbe in Germany. For the present we will allow them to be regarded as distinct.

I have now to point out a curious fact. In the winter of 1897-8, after I had described the Aster Worm, and recorded it for many different parts of the country, besides obtaining it under circumstances which clearly showed it was an indigenous British species, I found it had attacked my celery. During the early stages of the celery sickness only *Enchytræus parvulus* was noted. As the sickness progressed however, a new form made its appearance. Presently the two forms were equal in number, but eventually, in March,

1898, the second form entirely predominated, and *E. parvulus* was nowhere to be found. The strange fact is, that though I made memoranda and drawings at the time, but did not publish any note on the subject, these same two worms appear in equal numbers in the material sent me from Ireland. This is a most remarkable coincidence. Doubtless here again *E. parvulus* led the way. In January two forms were at work in equal numbers, and one may expect that by March *parvulus* will have disappeared, and the larger form be in supreme possession. Until I have time, and fresh material, I do not propose to name the second form, or attempt to identify it, though I have some curious memoranda and drawings which will throw light on its history among the material I have been collecting in former years. I want now to call attention to a new theory which I formulated four years ago, and which the Irish discovery tends greatly to confirm.

II.—ON A NEW THEORY OF LARVAL FORMS AMONG THE LOWER ANNELIDS.

In my note-books I find the following memorandum under date March, 1898, accompanied by a drawing:—"NOTE. Some weeks after discovering *E. parvulus* I again examined the celery, and found this worm (drawn by the side) in its place. I at once questioned whether *E. parvulus* may not be what one might call a larval form. Larvæ of gnats lay eggs; why may not worms, and then develop into higher forms?" A little later I added another note; then, owing to my removal from the neighbourhood of Birmingham, the work was laid aside, and no further opportunity occurred for carrying out the necessary research. Now, the surprising point lies here. The diseased celery from Ireland is infested with identically the same two worms as destroyed my trench. I have not heard of any one having seen the second form in Great Britain. I have not myself described it in connection with celery or aster sickness, nor am I aware that anyone, either here or elsewhere, has observed the phenomenon. How is it, then, to be accounted for, that when the Aster Worm, whether in England or Ireland, in 1897 or 1902, attacks celery, it is found to be attended by another form of

Enchytræus? My own suspicion is that the smaller and earlier form may be regarded as in some sense the larval stage of the later and larger.

Let us examine the possible explanations. If the problem had been submitted to me from without, in such a way that I had not had the case immediately under my own personal observation, I should have said :—

1. We may have here a case of symbiosis, or a kind of free parasitism. One is so familiar with this kind of thing in nature, that even if symbiosis among annelids is not yet proved, there is no reasonable ground for supposing it improbable. We know so little about the life-history of these lowly creatures that we cannot at present say what novelties may not be discovered among them. Perhaps, then, we have a case of symbiosis before us. If that may not be, then—

2. The first and smaller form may be regarded as a pioneer, preparing the way for the larger and later form. This, again, is a frequent occurrence. We know that there are many creatures which cannot win a livelihood except in the tracks of some other worker. It may be the two are related, or they may be widely separated forms. Some pests never initiate sickness or decay, but they speedily rush in when weakness has shown itself. So possibly the Aster Worm strikes the blow, and the larger species follows it up. That is a second hypothesis.

3. It is, however, not in the least contrary to fact or reason that the second and larger worm is a higher or adult form of the Aster Worm. The following are some of the arguments in favour of this theory. In the first place my experience hitherto shows that while the Aster Worm (*E. parvulus*) is the form most frequently found when disease begins to show itself, as time goes on the second form increases in numbers till they are equal—as in the case of the worms treated of in the foregoing section. Finally, the lesser form disappears altogether, and the larger takes the field, as in my own celery trench in 1898. I do not think there is any evidence at present to show that the larger and later form devours, ousts, or in any other way drives its lesser rival from the field.

Next I may add that, so far as I have been able to observe, it is somewhat rare for the lesser form (*parvulus*) to show

traces of having reached the adult stage. I speak here with some hesitation, because I have described and figured the organs of reproduction, and made note of eggs in the ovisac of the Aster Worm. But this fact would not weaken my theory since we know that the larvæ of some gnats lay eggs, and it is, therefore, not unreasonable to allow that the larval forms of annelids may do the same. We have, again, the analogy of the Mites to help us. The *Eucharis* mite, for example, develops from a creature with six legs in the larval stage, to one with eight in the imago. What is there, then, in the nature of things to prevent a worm from developing in the same way? If this theory of evolution through a larva be accepted, it will throw light on a number of points in the anatomy and life-history of some species of worms which are at present obscure. It might further aid us in understanding and reconciling the descriptions of some of the earlier naturalists, who, studying the larval and imago forms at the same time, tell us that the setæ and certain organs vary in number, size, position, and other details in the different specimens.

To me, therefore, it seems that we have here a capital working hypothesis, and one cannot but wonder that some of the many admirable workers among the annelids have not hit upon the theory before. If we grant that worms may pass through different stages of development, we may have a possible clue to the meaning of *Lumbriculus*, for example, which seems very clearly to be a larval form. It has never yet been found in this country in a mature form, though Vejdovsky reports adult forms from some Continental habitat. Moreover, a new light will be thrown upon the position which worms hold in the scale of being. We shall see them to be arrested forms of life, which, though they have themselves been evolved from lower larval forms, have yet been unable to get beyond the grade of larvæ. When, too, we remember that larvæ moult, we shall not find it difficult to believe that if the Aster Worm does not produce another form of worm by an alternation of generations, it may do so by shedding its skin, and at the same time assuming a different number of setæ. I shall hail with delight any facts which enable us to solve one of the most interesting problems which the study of annelids has yet suggested.

In order to establish or disprove the theory I have advanced, it would be necessary to pay great attention to details. It will readily be seen that a good many experiments would have to be undertaken. Check-plants would be required, and every precaution taken for the proper registration of results. This would be a capital task for a working naturalist or biologist. He would require, however, to have a pretty accurate knowledge of annelid anatomy, since such important characters as the brain, sperm-sacs, salivary glands, and other important features would require special attention. On account of the great importance of the question to gardeners, florists, and agriculturists, it would be a wise thing if one of the learned societies or the Board of Agriculture would authorize the carrying out of the work at their expense. Bulbous or succulent plants, such as tulips or celery, would be far better for experiments than asters, as the vitality of the latter is much more readily exhausted than is that of the former.

Chichester.



IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include four Jerboas and two Owls from Dr. C. B. Ball; a Wigeon from Mr. R. Warren; a Teal from Miss M Guinness; a Coot and a Lapwing from Mr. R. Warren; three Golden Pheasants from Colonel Massy; a Suricate from Major Gage; a Hare from Mr. J. Keary; and a Peregrine Falcon from Mr. J. Olphert; a Chimpanzee, a Civet Cat, and a Paradoxure from Justice Smyly.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

APRIL 8.—A meeting was held in the Museum, when a paper was read by Mr. JOHN L. MACASSEY, C.E., on the subject—"The Mourne Scheme for the Supply of Water to the City of Belfast."

DUBLIN MICROSCOPICAL CLUB.

FEBR. 12.—The Club met at Leinster House.

Mr. MOORE showed flowers of *Pleurothallis macroblepharis*, a very minute Orchid from New Grenada. This is popularly known as the Gnat Orchid, as the flowers, which are dull grey in colour, hang horizontally from delicate thread-like stalks, and at a distance resemble a group of gnats or midges. Scattered over the sepals are minute blotches of purple red colour—which, when viewed through the microscope, are seen to be due to groups of cells containing coloured sap, these cells having sometimes cells with colourless sap scattered amongst them.

Mr. M'ARDLE exhibited *Codonia Ralfsii*, Wils., Gottsche, and a slide showing the antheridia. The specimens were collected last January by himself and the Rev. Canon Lett on the damp hollows among the sand-hills at Malahide, Co. Dublin, where it was first found many years ago by the late Dr. D. Moore. In mode of growth it resembles *Fossombronia*, but it is easily separated from that genus and all others by the peculiar lamellar processes of the fronds. The only other localities known for this rare hepatic in Ireland are the North Bull, Dollymount, Co. Dublin, and East Innyferry, Waterville, Co. Kerry, where Dr. Scully discovered it in 1889. In England, about Penzance, Cornwall, collected by Ralfs and others. Collected at Anglesey, Holyhead, by Mr. Pearson in 1900; it is also reported from Southport, in Lancashire, and Contham Marsh, Yorkshire. It was collected by M. Trabut in Algiers.

BELFAST NATURALISTS' FIELD CLUB.

FEBR. 18.—Mr. CHARLES M. CUNNINGHAM, L.D.S., read an interesting paper on "The Teeth of Vertebrates." Previous to the formal meeting, the usual "Science Gossip Half-hour" occupied the members' attention, various objects of interest being exhibited and discussed. The chair was taken by Mr. WILLIAM GRAY, M.R.I.A., who opened the proceedings by referring in feeling terms to the loss the community had sustained by the death of the Marquess of Dufferin and Ava, who was one of the three honorary members of the Club. Mr. Cunningham then proceeded with his lecture. He began by pointing out the important part which teeth had played in the identification of extinct animals, their extreme hardness rendering them more indestructible than other tissues. Primitive forms of teeth were then described, and the lecturer explained the difference between horny teeth and true teeth, emphasising the necessity of regarding dentine as the essential element in the latter. Then followed an interesting series of illustrations showing peculiar features in the teeth of fishes; the serried rows of teeth in the sharks, the hinged teeth of the Hake, the palatine, vomer, and throat teeth of other fishes, and the remarkable teeth on the "saw" of the Sawfish. An account was then given of the teeth of reptiles, proving their primitive type, and the working of the wonderful poison-apparatus of the Rattlesnake was

described in all its important details. After pointing out the difference between the homodont dentition of reptiles, and the heterodont dentition of mammals, the lecturer described the teeth of herbivores at some length, and laid special stress upon the correlation of growth shown in the ruminants by the curious relation between the canine teeth and horns. For instance, deer which have powerful horns have no canine teeth, whereas deer which are hornless have well-developed and powerful canine teeth. Teeth of continuous growth were treated with some detail, illustrations being furnished by the swine, the rodents, and the elephants. After mentioning the powerful teeth of the carnivores, the lecturer concluded with a reference to the remarkable dentition of the Kangaroo. The lecture was illustrated by over fifty specially-prepared lantern slides and a large series of typical skulls and teeth. After some discussion, in which Mr. Gray and Mr. Welch took part, the audience came forward to examine the examples on the table.

MARCH 18.—Mr. J. VINYCOMB, M.R.I.A., presided.

Mr. ROBERT MAY read a very interesting paper on "Old Ulster rush-light candlesticks, cruises, and other allied objects." Over fifty specimens were exhibited by the author in illustration of his remarks.

Mr. Wilson moved, and Mr. Swanston seconded, that the paper be published *in extenso* in the *Proceedings* of the Club.

Mr. JOSEPH WRIGHT, F.G.S., read a communication on "Foraminifera from Boulder Clay." Boulder clay forms the subsoil of the greater part of the British Isles, extending from sea-level to a height of 1,500 feet above the sea. These clays, when examined microscopically, have been found to contain the shells of foraminifera, which must have lived at these places when the clay was being deposited. Almost all the forms that have been found are referable to species which are at present living at various depths off our coast, differing from them only in being somewhat smaller in size. Many of the forms are lovely objects under the microscope, and so minute in size that it has been estimated that one hundred thousand specimens would fit on a sixpenny piece. These microzoa, and also shells more or less broken, have been got in clays and gravel at the following places, at from 1,000 to 1,300 feet above the sea:—Three-Rock Mountain, County Wicklow; Moel Tryfaen, Wales; Ayrshire, Scotland; and Divis Mountain, County Antrim.

The recent examination of boulder clay at Knock Glen has given very interesting results; seventy-six species of foraminifera were obtained at this place, many of them being very rare forms. Seven of them are known as recent British species, only from deep water off the west coast of Ireland, three of these being also recorded from the west coast of Scotland. The occurrence of these species would lead us to infer that the clay at the Knock Glen was deposited when the land stood at a much lower level than now, when the tops of our highest mountains were alone above the sea, and when the British Isles were a group of

small islands off the west coast of Europe, the marine condition being very similar to what now prevails off the west coast of Ireland. The lecture was illustrated with a number of diagrams, and after the meeting specimens of the foraminifera were shown under the microscope.

The election of several new members brought the meeting to a close.

DUBLIN NATURALISTS' FIELD CLUB.

MARCH 11.—Professor COLE presided, in the absence of the President. A series of demonstrations were given in connection with the prizes offered by the Club during the present year for Natural History research, in order to assist intending competitors, by pointing out the lines on which work should be carried on so as to ensure the best results. The following is the list of prizes offered by the Club:—Prizes value £1 each; in Botany—Lichens; succulent flowering plants. In Zoology—Fresh-water fishes (Co. Dublin); Crustacea. In Geology—Co. Dublin Erratics; Carboniferous limestone fossils from the Raheny quarry. Special prizes, value £1 10s. each:—(a) A map showing the distribution of heather in the Ordnance Sheet No. 112; (b) Best answers to the Conchological Society's questions lately published in the *Irish Naturalist*; (c) An account of the Carboniferous conglomerate at Rush. The demonstrations, which were illustrated by lantern transparencies and specimens, were given by Mr. CARPENTER, Prof. COLE, and Messrs. HALBERT, LAMPLUGH, PRAEGER, PETHYBRIDGE, and SEYMOUR, each of whom dealt with one or more of the prizes above enumerated. Two new members were elected, and one nomination received.

APRIL 8.—The last business meeting of the session took place, Mr. W. F. de V. KANE (President) in the chair. Mr. F. O'B. ELLISON read a paper on the development of the flower in *Samolus Valerandi* (Brookweed). The account was illustrated by numerous lantern slides prepared from sections, showing the flower in various stages of growth. Dr. Pethybridge and the President spoke on the paper. Mr. T. CROOK then showed a number of lantern slides illustrative of some typical rock-structures, as seen in their sections under the microscope, and explained in a few words the special points exhibited by each of the sections. Mr. Seymour made a few remarks on the communication. Mr. WILLIAMS then exhibited an example of the Great Snipe, and pointed out some of its distinguishing characteristics. He also showed some Indian butterflies, exemplifying the principle of protective colouration in insects, the butterflies, when the wings are folded, exactly simulating a faded leaf in every particular. Professor Patten and the President made a few remarks on Mr. Williams's exhibit. One new member was elected.

REVIEWS.

ECONOMIC ZOOLOGY.

Insects Injurious to Staple Crops. By E. DWIGHT SANDERSON, B.S. Agr. Pp. x. + 295. 162 figures. New York: Willey & Sons, 1902. Price \$1.50.

Naturalists and farmers in these countries have much to learn from their American colleagues about injurious insects, and in the handy little volume now before us, the latest results of transatlantic economic practice are clearly and concisely summarised. The author introduces his subject by giving an outline of the amount of injury caused to various crops by insects, reduced to money values. This should surely tempt all severely "practical" person to look into the brief account of insect structure and development given in chapter 2. Then after an account of the general farm methods against insects, and a survey of the groups of insects beneficial to the farmer and worthy of protection and encouragement, follows the detailed account of the common North American injurious species grouped under the crops that they injure. The Irish cultivator may not be specially interested in "Chinch-Bugs," or in "Cotton-boll Weevils," but the accounts of Wireworms, and "Cut-worms"—that is, Owl-moth caterpillars—will be useful to readers on this side of the ocean, for though the species of these insects commonly occurring in North America are different from ours, they are nearly related to our destructive kinds and similar in habits.

The illustrations are on the whole excellent, many being taken from the fine figures of the United States Department of Agriculture. Like many American workers, Mr. Sanderson largely uses photographs from actual specimens, reproduced by means of half-tone blocks. These are very unequal in merit. The "Army-worms at work on Corn-plant" shows how splendidly this method of illustration can succeed, the "Mouth-parts of Grasshopper" how completely it can fail to give any clear idea to the uninstructed reader of the objects supposed to be represented.

G. H. C

Gartenfelnde und Gartenfreunde, von Prof. H. KOLBE. Pp. 320. 76 figs. Berlin: Karl Siegismund, 1901. Preis Mk. 3.60.

From the east as well as from the west comes to us instruction on this most important subject, and most of the animals described by Prof. Kolbe are also our "Garden foes and friends." Here we have first of all an account of the structure, life-history, and classification of insects, then a sketch of the various means for destroying them, and then an account of the injurious species, grouped under the various trees and herbs that

they attack. Only about fifty pages are devoted to the "Garden friends," but we are glad to see here due acknowledgment paid to the services of beasts, birds, and even entomophagous fungi, as well as to those of predaceous insects. The practical directions for destroying the various injurious species are concise and business-like. It is of interest to gather from a popular continental work like this, how many of the species most injurious to the cultivator vary in different countries. For example, we find insects most markedly destructive with us—such as the Cabbage-root Maggot (*Phorbia brassicae*), and the Black Vine Weevil (*Otiorynchus sulcatus*)—passed over in a few lines. The illustrations are reproduced so as to give a delicate, artistic effect, now and then lacking in clearness, but always pleasing.

G. H. C.

BIRDS' NESTS.

Birds' Nests: an Introduction to the Science of Callology.

By CHARLES DIXON, Author of "Rural Bird-Life," &c. With illustrations by A. T. Elwes. London: Grant Richards, 1902.

That prolific writer, Mr. Charles Dixon, has turned his attention to "Callology"—the scientific study of birds' nests. His latest ornithological work aims not only at giving some account of the various types of nests found in nature, with the *rationale* of each type, but also at supplying a philosophical explanation of the nature of the nest-building habit. The volume is so well stored with facts that it cannot fail to be recognised as a valuable addition to the literature of ornithology. The illustrations, too, are interesting, though we are left in regrettable uncertainty as to how far we can rely on their accuracy; for Mr. Dixon himself finds it necessary to point out that the nest of the Magnificent Sunbird (*Æthopyga magnifica*) is quite incorrectly drawn, the artist having represented it as pendulous, which it is not. When, however, we pass from ascertained facts to the argumentative and speculative parts of the book, it must be said that the impression produced is disappointing. Mr. Dixon does not appear to have thought his theories out. There is an excess of high-sounding language, a superabundance of scornful epithets for the popular belief in a "nest-building instinct," which Mr. Dixon rejects as a "superstition," a "prejudice," "not supported by a single particle of fact," &c., &c. Yet we feel bound to say that the facts appealed to as "conclusively disproving" this belief seem to us extremely inconclusive, the arguments unconvincing, and the counter-explanation put forward by Mr. Dixon himself so far from satisfactory that we scarcely hesitate to pronounce it absolutely untenable.

Briefly, Mr. Dixon's theory is that a young bird inherits from its ancestors no instinctive knowledge of the way to build a nest, but that it acquires that knowledge for itself, chiefly in two ways;—(1) by exer-

cising its powers of observation, while still a nestling, in examining the architecture of its nursery, and noting the materials employed in the structure; and (2) by watching some older birds of its own species at work in the following spring with a view to copying their procedure.

Adopting Mr. Dixon's own language, we may reasonably ask whether this theory is "supported by a single particle of fact." There are, at any rate, several facts which, to our thinking, conflict heavily with it.

Taking first the supposed effects of observation during the nestling stage, how can this hypothesis be reconciled with the fact that many young birds are reared in the dark, and cannot study, because they cannot see, the structure of their homes? This is the case with some of the most accomplished of our feathered architects, such as the Long-tailed Titmouse, whose eight or ten youngsters, crowded tightly together in the dark interior of their lichen-thatched dome, are debarred from all possibility of noting the position, the materials, or even the shape, of the nest in which they are brought up. A still greater puzzle is afforded by the South American *Lochmias nematura*, whose nest, situated at the end of a narrow underground gallery, consists of "a vaulted globe with a lateral entrance," whose "interior lining is of crossed bamboo leaves, woven in a really artistic manner." The inner lining of a domed nest built underground must be exceedingly difficult to study as a pattern. Yet Mr. Dixon makes no attempt to explain the transmission of the artistic accomplishment of *Lochmias nematura* from generation to generation. In fact, he entirely ignores the difficulty presented to his theory by the exclusion of light from the interiors of so many nests.

Nor can more be said for the second suggestion—that birds, when a year or so old, supplement the knowledge acquired in infancy by watching experienced builders at work. With species which nest gregariously this is, of course, possible; but Mr. Dixon's theory requires that it should be equally open to solitary nesters, and here the difficulties in the way seem almost insuperable. Birds in the nesting season are extraordinary prompt to repel any intrusion by others of their own species within a fixed distance from the chosen site. Each pair appropriates an area to itself, and fight savagely with all who invade that area. No such thing as "a chiel amang us taking notes" is tolerated by building birds in spring. And it is needless to point out how very close the approach must be to enable one Grasshopper Warbler, for instance, or Stonechat, or Blue Titmouse, to watch another at work. Instant detection and a severe mauling would be the inevitable consequence.

Even among gregarious nesters, it not rarely happens that there are no experienced builders for the beginner to watch. The House-Martin builds a nest which, barring accidents, will last the bird's lifetime. Thus practically all the nests of this species, in localities not subject to disturbance, are first structures, the work of novices.

We by no means question Mr. Dixon's statement that beginners often build imperfect nests, and that the building faculty is improved and developed by practice. Mr. Dixon considers this alone a sufficient and

conclusive disproof of the view that the faculty in question is an inherited one, but it is pushing his argument much too far to claim any such conclusion; nor does the interesting but isolated fact that a pair of Chaffinches which had been transported young to New Zealand built a somewhat abnormal nest at all warrant his trumpeting forth of "the now absolutely proved fact that birds are incapable of building a nest typical of their species without the aid of imitation or experience." By the way, why drag in "experience" here? If the knowledge is not instinctive, the later efforts of the exiled Chaffinches ought to be no nearer the ancestral type than the first was. But Mr. Dixon's reference to "experience" as an alternative to "imitation" leads us to suspect that his data are not in full harmony with this logical requirement.

C. B. M.

NOTES.

BOTANY.

Vegetable Bricks.

I have seen with interest Mr. Welch's note in the *Irish Naturalist* as to the use of vegetable bricks in Belfast. He, however, attributes the use of "peat bricks" to jerry builders. I have seen in the South of Ireland many walls in the best built houses constructed of such bricks, and have also seen them used in new houses of the present day, and their use is quite intelligible. First, they make a very light wall, and can consequently be used in a partition across the floor without much strengthening of the floor, and are much better non-conductors of sound than lath and plaster partitions. Second, they make an excellent lining for an outside wall built of black stone. Their use here is also not only intelligible, but might be followed with advantage by modern architects, as they interpose a non-conductor of heat between the warm, damp interior atmosphere of the room and the cold outside wall, thus obviating the condensation of moisture on the wall, and the consequent destruction of the paper-hangings.

H. BANTRY WHITE.

Dublin.

Turf walls exist in most of the old houses in this and neighbouring counties, and probably throughout Ireland. It is commonly claimed for the material that it is superior to brick or stone in such qualities as warmth, dryness, elasticity, &c.

W. E. HART,

Kilderry, Co. Donegal.

Another inland Station for *Erodium cicutarium*.

In *Irish Topographical Botany*, eight stations, more or less inland, have been recorded for *Erodium cicutarium*, one of them being Castlewellan, in County Down. That, however, is not far distant from the coast, and it may, therefore, be of interest that I should supply a note of its occurrence in a more distinctly inland locality in the same county. It was observed on the 6th of the present month—April—near the left bank of the River Bann at Moyallon, which is close on the border of Co. Armagh. At that time it was in flower, and, indeed, one plant was noticed with fully-formed, almost mature fruit, so that it must have borne flowers some two or three weeks previously, an instance, I think, of unusual precocity.

J. H. DAVIES.

Lisburn.

[I should be glad to know in what quantity the plant occurred here, and in what kind of place. It is not unknown far inland as a casual.—R. L.L. P.]

Cakile maritima in Co. Sligo.

I see by Mr. Praeger's *Topographical Botany* that this plant has not been recorded from Co. Sligo. I met with it at Enniscrone last August; there were two large beds of it just at the mouth of the River Moy—one inside the estuary, and the other on the seaward side of the sand-hills; one of the beds extended for fully three hundred yards along the shore.

W. F. JOHNSON.

Poyntzpass.

Irish Brambles.

To the *Journal of Botany* for February, Miss Eleonora Armitage contributes a note on Brambles collected in Co. Limerick last year. One variety is new to Ireland and five species new to Limerick.

ZOOLOGY.

Vanessa io in Co. Donegal.

Last year's invasion of Ulster by the Peacock Butterfly and its subsequent breeding in the north has been followed by a record of its hibernation. Mr. Arthur Bourke, of Whitehouse, Killybegs, has lately sent to the Museum a specimen that he captured on February 25th near Killygowan, Co. Donegal.

G. H. CARPENTER.

The Butterflies and Moths of Co. Cork.

The *Entomologist* for December and January last contains an interesting list of Lepidoptera (A List of the Lepidoptera of County Cork. By C. Donovan, M.D., F.E.S., Capt. I.M.S., and R. J. F. Donovan. *Entomologist*, xxxiv., 1901, pp. 333-336; xxxv., 1902, pp. 10-14), collected chiefly in the south-western parts of Co. Cork at various times during the last eighteen years—and not, as the title might imply, a complete list of the species which are known to occur in the largest of our Irish counties. The bulk of these records have already been included in Mr. Kane's recently completed Catalogue of Irish Lepidoptera. Nevertheless, students of this group will find in Messrs. Donovan's List many previously unpublished notes, some of these referring to the life-history of such insects as *Sesia musciformis*, *Bryophila muralis*, and others of equal rarity.

Some twenty-four species of butterflies were observed, which may be considered the usual average for an Irish county, seeing that only about forty kinds are established denizens of this country. Two species, the Clouded Yellow (*Colias edusa*) and the Peacock (*Vanessa io*), are recorded as common, the former in certain years; these are insects which rarely fall to the net of Northern collectors. The absence of the Brown Hairstreak (*Thecla betulae*) from the list is notable, as this species was said to be common in the South and West of Ireland by the late Edwin Birchall; but recent work has shown that this statement is an exaggeration.

Amongst the moths, besides the capture of a large number of rarities, the authors have been successful in making at least three additions to the Irish fauna: the most interesting of these being the fen-frequenting *Nonagria sparganii*, taken commonly in marshes between the Old Head of Kinsale and Glandore. Also *Laphygma exigua* and *Sterrhia sacraria*; single examples of both of these were captured in the vicinity of Timoleague. Captain Donovan is to be congratulated on the discovery of a fresh locality for the Hill of Howth Moth (*Dianthecia Barrettii*), specimens of which were taken at Courtmacsherry, thus extending the known range of the local species in Ireland—the previous records being Howth and the coast of Waterford. Of interest also is the occurrence of what the authors consider to have been a recent immigration of the Mullein Moth (*Cucullia verbasci*), first noticed in the summer of 1901. The caterpillar of this species is of a bluish-white ground-colour, with yellow and black markings, and being strikingly conspicuous on its food-plants, and the authors think they could hardly have overlooked it in previous years, It occurred plentifully on *Scrophularia* and *Verbasum*.

A short list of "Microlepidoptera" is given, and the writers promise further researches in this section of the Lepidoptera, a study in which they are certain to be richly rewarded, as it has been much neglected by collectors in this country.



DUNMORE HEAD.

The most westerly point of the Dingle Peninsula.

C. J. Patten, Photo.

[To face page 125.

A LIST OF BIRDS OBSERVED WEST OF DINGLE, CO. KERRY.

BY PROFESSOR CHARLES J. PATTEN, B.A., M.D.

(PLATE I.)

THE district which extends west of Dingle constitutes part of the most northerly of the large projecting peninsulas which so well characterize the western and south-western sea-boards of Kerry.

This stretch of country is chiefly maritime. Its coast is rendered highly irregular by the presence of smaller headlands and inlets of the sea. The interior of the country is made up of rugged, unreclaimed land, with but scanty foliage and timber, and traversed by hills of remarkably varying altitudes. Of the headlands, Brandon, Sybil, and Dunmore are perhaps the most prominent. Here the cliffs are high, precipitous, and in parts of a cavernous nature, thereby affording shelter and natural habitat to the many species of birds which are wont to frequent such places. The swift-flying Rockdove is the principal tenant of the caverns, often finding in them a haven when sorely harassed by the pursuits of its dreaded foe, the Peregrine Falcon. Although bleak and stupendous, the cliffs, on the whole, are not void of vegetation. Here and there rocks jut out, covered with grasses and other maritime plants. These carpeted ledges are the favourite resting places of the Choughs, large numbers congregating there, especially when they return at night-fall to roost.¹ The entertaining movements of these birds have afforded me many an hour's pleasant observation. I have frequently seen the young Chough fly into fissures and caves, probably back to the nest where it had but recently been reared. I was late for the breeding season, but found that many of the fully fledged young birds were so confiding as to allow me to approach quite near to them.

¹ Many Choughs, however, do not remain on the ledges, but seek shelter for the night in rock-fissures and caverns.

From the summit of the cliffs I could see, almost daily, the Hooded Crows, those carrion lovers and useful scavengers, revelling in a meal of marine offal which had been cast aside by the hardy fisherman after his arduous daily toil. Fierce battles often ensued between the crows and sea-gulls over, perhaps, an especially dainty morsel of fish.

The wide open sea, as I watched it from the cliffs, never looked lonely. Far from it, it was teeming with bird life. Gannets were busily fishing, and these birds, by their size and wonderful aerial movements, first arrested my attention.

What ardent bird-lover is there who is not filled with enthusiasm as he watches these expert anglers? See them! They have surprised a shoal of mackerel, and now, with closed wings, and with the speed of a cannon-ball, they are plunging head foremost through the air into the waves beneath.

I first witnessed Gannets¹ fishing in Dundalk Bay, on the east coast. From a steamer I watched their movements. So sudden was the plunge, and so great the splash, that for a moment I almost failed to recognise the form of a bird, and could well have believed that some mighty power was hurling huge boulders into the waters from some great quarry overhead.

Continuing my observations from the cliffs, many other forms of bird-life presented themselves to me. Wisps of Terns, frail and slender, compared with the more powerful Gannet, were fearlessly plunging through the angry surf in pursuit of fish. Guillemots, Razorbills, and Puffins thickly studded the open sea, appearing as specks from my lofty observatory. Sable-plumed Cormorants and Shags were sitting in numbers on the tops of the uncovered, wave-swept rocks, ever and anon fanning their wings in the warm sunshine. Beside them rests the purer-plumed Seagull, an embodiment of elegance and grace.

But mighty cliffs and deep seas do not form the sole environment of this peninsula. Charming sandy beaches beautifully studded with shingles, shells, and seaweeds, are to be found about Ventry, Smerwick, and Dingle.²

¹ A flock of over 50 birds.

² To these may be added a long, tongue-like stretch of sand called Inch.

In these places I was attracted by a different group of birds, and one which, to my mind, is the most fascinating, namely the "Waders." It is not my intention in this prefatory note to refer to all the different species I observed. Let me say here, however, that at ebb tide the sandy beaches were frequented by flocks of Curlew, Oyster-catchers, Ringed Plovers, Turnstones, and other species, which added greatly to the charm of the district. Often have I seen the Curlew quit the beach and fly to the ploughed fields over the cliffs, on the look-out for earthworms, a favourite meal. Now and again the Oyster-catchers left the sands and rested on the rocks; a flock of them making a pretty study in black and white.

It was refreshing to turn one's ear to the mournful, plaintive cry of the "Waders," so musical when contrasted with the harsh screaming of the Sea-gulls, rendered more discordant by the loud bassoon-like voices of the Cormorants.

Lastly, as I continued my expedition through the interior of the peninsula, I observed very few species. This fact did not surprise me. Trees were practically absent, and warblers and other sylvan birds did not abound.

The ubiquitous Robin, the Wren, the Hedge Sparrow, the Blackbird, and some other familiar birds were, however, scattered over the peninsula. The avi-fauna, west of Dingle, contrasts with that of many other districts. As one example, take the Dublin coast. In the latter locality the Chough is now absent, while it abounds in the former. Again, the Hooded Crow and Rock-Dove are to be occasionally seen, and only in small numbers along the Dublin coast, whereas west of Dingle both these species are abundant. On the contrary, the Wood-Pigeon, Rook, Jackdaw, and Magpie (all widely distributed species), are not very plentiful about the western point of the Dingle peninsula, although they are numerous and well known along the coast-lands of Dublin.

Finally, of rapacious birds, the Peregrine Falcon, and Sparrow Hawk deserve special notice. These species frequent both districts, but west of Dingle the Peregrine is much more common than about Dublin, whereas the Sparrow Hawk is seldom met with in the mountainous and bare treeless parts of western Kerry.

PASSERES.

- Turdus viscivorus**, Linn. MISTLE THRUSH.—Observed several scattered over the fields in the summer. In winter they were more numerous.
- T. muscus**, Linn. SONG THRUSH.—Like the former more numerous in winter. Observed only five in the summer.
- T. iliacus**, Linn. REDWING.—Noted only two in winter. (Dec. 28th.)
- T. merula**, Linn. BLACKBIRD.—Observed several scattered over the fields. More numerous in winter.
- Saxicola œnanthe**, Linn. WHEATEAR.—Common in the summer.
- S. rubicola**, Linn. STONECHAT.—Observed a few pairs in the summer. Probably overlooked this bird in the winter.
- Erythacus rubecula**, Linn. RED-BREAST.—Generally distributed. Observed the greater number in the winter.
- Sylvia cinerea**, Bechs. GREATER WHITETHROAT.—Observed six in the summer.
- Phylloscopus trochilus**, Linn. WILLOW-WREN.—Noted one near Ventry, 25th August.
- Accentor modularis**, Linn. HEDGE-SPARROW.—Observed several in summer and winter, even in the most bleak and treeless districts of the peninsula.
- Cinclus aquaticus**, Bechs. DIPPER.—Observed two on the 12th August, flying along a stream in "Mount Eagle," near Dunmore Head.
- Parus cœruleus**, Linn. BLUE TITMOUSE.—Observed small numbers in the more sheltered parts of the peninsula.
- Troglodytes parvulus**, Koch. WREN.—Quite common in summer and winter, even about the stupendous cliffs.
- Motacilla melanope**, Pall. GREY WAGTAIL.—Noticed a solitary bird at Smerwick Harbour on the 20th August.
- Anthus pratensis**, Linn. MEADOW PIPIT.—Common in summer and winter.
- A. obscurus**, Lath. ROCK PIPIT.—Plentiful, especially around the cliffs. Is also common on the mud flats near the town of Dingle.
- Hirundo rustica**, Linn. SWALLOW.—Common in the summer.
- Chelidon urbana**, Linn. MARTIN.—Plentiful round some of the high cliffs in summer.
- Ligurinus chloris**, Linn. GREENFINCH.—Observed only two (male and female) near Ballyferriter on the 28th December.
- Carduells elegans**, Steph. GOLDFINCH.—Observed a party of five on December 29th. "Common in Valentia" (*Ussher*).
- Passer domesticus**, Linn. HOUSE SPARROW.—Scattered over the district, and plentifully distributed. At the westerly point of the peninsula there seemed to be a diminution in numbers.
- Fringilla cœlebs**, Linn. CHAFFINCH.—Generally distributed. Observed two flocks in winter—December 30th—consisting almost entirely of male birds; the proportion being one female to every thirty males.

Linota cannabina, Linn. LINNET.—Observed several flocks, but none of them very large.

L. flavirostris, Linn. TWITE.—Very numerous and tame.

Emberiza miliaria, Linn. CORN BUNTING.—Observed several; they appeared more numerous in winter. "Decreasing near Dingle" (*Ussher*.)

E. citrinella, Linn. YELLOW BUNTING.—Plentiful.

Sturnus vulgaris, Linn. STARLING.—Observed several in winter, not many in summer.

Pyrhonorax graculus, Linn. CHOUGH.—Plentiful at the extreme western point of the peninsula, where flocks of a hundred might be seen. On the 23rd August I obtained a splashed variety; a specimen with a few white feathers on the head and wings. I often observed the Chough in ploughed fields and on the mountains, and on more than one occasion I watched a pair of these birds perch on a church-steeple. My friend, Rev. W. J. King, tells me that Choughs often alighted on the roof of his late residence at Ballyferriter, a village some five miles from the point of the peninsula.

Pica caudata, Scop. MAGPIE.—Less numerous here than in many other parts of Ireland. At the extreme west of the peninsula I did not notice it. *Ussher* says "it becomes scarcer in the treeless districts of Western Kerry," and my observations about Dingle corroborate this statement. In the winter I noticed four together hopping on the middle of a road about three miles west of Dingle.

Corvus monedula, Linn. JACKDAW.—Comparatively scarce at the western end of the peninsula, its place on the cliffs being taken by the Chough. Does not breed on the western islands of Kerry (*Ussher*). About the town and outskirts of Dingle it is somewhat common.

C. corax, Linn. RAVEN.—Watched a pair from the cliffs of Dunmore Head on August 15th. They were flying over the sea on a level with the top of the cliffs. They frequently swooped, twisted, and chased each other as if in play. Some of the natives of Dunmore (*Dunquin*) informed me that a pair of these birds often appeared if a carcase was lying about the district.

C. cornix, Linn. HOODED CROW.—Plentiful, especially at the westerly point of the peninsula. *Ussher* has noted that the Hooded Crows west of Dingle have the grey parts lighter in colour and of a more bluish tinge than those further east.

C. frugilegus, Linn. ROOK.—Not plentiful at the westerly point of the peninsula. Common close to Dingle. On the 29th December I observed two splashed varieties. One had a large white patch on the left wing. The head of the other was speckled black and white. Both birds were feeding in a ploughed field in company with a small flock of their own species.

Alauda arvensis, Linn. SKYLARK.—Generally distributed. More numerous in winter.

PICARIÆ.

Cypselus apus, Linn. SWIFT.—Observed two on the 11th August near Dunmore Head.

STRIGES.

Strix flammea, Linn. BARN OWL.—On the 23rd August an inhabitant of Dunmore watched “a strange light-coloured hawk,” as he called it, fly in from over the sea to the cliffs. The bird on reaching the precipice entered a rock-fissure and disappeared. The brave native descended the face of the cliff. I saw him thrust his hand into the crevice. Quickly he withdrew it holding a Barn Owl. The bird lacerated him considerably with its talons, but the stout Irishman did not relax his grasp, and succeeded in ascending the cliff holding the bird triumphantly in his hand.

I made a pet of this Barn Owl, and kept it for over two months in captivity. Finally I presented it to the Dublin Zoological Gardens. It seemed to prefer a rat to any other form of diet, sometimes being tempted to “dine” off one even in the middle of the day. This was the only owl I observed on the peninsula. On questioning the natives they said “they had never seen the like before.”

ACCIPITRES.

Circus cyaneus, Linn. HEN HARRIER.—A few are said to roam over the Dingle peninsula. West of Dingle I observed this species only once, viz., August 11th. It was flying over the brow of a hill near Dunmore Head, and it came so close to me that I was able to identify it as either an adult female or an immature bird in the brown plumage. It frequently retraced its flight over the moors, and more than once it “brushed” by me not fifty yards distant. My friend, Rev. W. J. King, who resided west of Dingle for many years, has repeatedly noticed the Hen Harrier on the peninsula. In a letter to me he describes its flight:—“Low and listless it flies along, skirting the tops of stone walls, backwards and forwards over the bogs, never alighting, but always coursing after something or another.” He adds:—“The adult blue-coloured bird is very beautiful as he skims noiselessly over the mountain boglands.” I have not met with an adult male Hen Harrier west of Dingle, but near Killorglin I had a splendid view of one on the 3rd of January, 1901. This interesting hawk is decreasing in Ireland. Ussher states:—“Kerry is one of its chief strongholds. It breeds on the mountains both north and south of Dingle Bay.”

Falco peregrinus, Tunst. PEREGRINE FALCON.—I observed one or two nearly every day on my rambles through the peninsula. A pair frequented the side of a steep hill near Ballyferriter. They usually appeared after a shot had been fired. On one occasion (December 28th) when I had winged a pigeon a Peregrine nearly succeeded in snatching up the wounded bird as it fluttered on the ground. However, I bagged my game before the hawk “stole a march” on me. Another time (August 31st) I witnessed a chase between a male Peregrine and a Swallow. The nimble little bird was pressed hard by its assailant. Backwards and forwards, high and low, they both flew;

when suddenly the swallow took a sharp swerve to the right and then shot obliquely upwards. This movement was too much for the falcon, and the latter lost so much "ground" that he abandoned the chase in disgust, rising in a circling manner far up into the air until he appeared a mere speck in the sky. As a rule, Peregrines do not follow such small birds. (See under Lapwing, p. 132.)

Perhaps this particular one meeting the poor little Swallow, isolated from its companions on the lonely waste, considered that this was a good opportunity to whip up the defenceless bird in its claws and to carry it off.

I have seen a small male Peregrine seize a Jackdaw in the air, and bear it away as if it were no weight whatsoever. My friend, Mr. King, lost several large, half-grown chickens through the ravages of the Peregrine. He shot a female just as it struck a fowl the size of a grouse. He describes the wound that the victim received from the blow of the Falcon's talons as being a terrible one. "The chicken was actually split open from sternum to tail, and was partially eviscerated. It died in a few minutes."

"Dr. Kane has frequently seen the Peregrine follow a sportsman during the day on the Dingle peninsula, and take away game just shot or wounded."—(*Ussher*).

F. æsalon, Tunst. MERLIN.—Observed several, chiefly on the unreclaimed moorlands west of Dingle. Of eight Merlins noted in the month of August, only one appeared to be an adult male, with a bluish, slate-coloured back. This last bird was perched on a leafless weather-beaten tree-stump when I came suddenly upon it. I watched it from behind a rock for several minutes. It was standing on one leg, with its feathers loosely puffed out, and its head sunk between its shoulders. When I appeared from behind the rock it took flight. I have shot the Merlin on the Greater Blasket Island, west of the Dingle peninsula.

F. tinnunculus, Linn. KESTREL.—Observed a Kestrel, or two, almost every day in the month of August. I only saw two in the winter (Dec. 29th), near Ballyferriter.

STEGANOPODES.

Phalacrocorax carbo, Linn. CORMORANT.—Common round the coast of the peninsula.

P. graculus, Linn. SHAG.—Appeared more numerous than the preceding species.

Sula bassana, Linn. GANNET.—Observed several fishing around the coast of the peninsula; many being in the dark, immature plumage. Some of the inhabitants informed me that they capture the Gannet and cook it. They consider it an excellent dish.

HERODIONES.

Ardea cinerea, Linn. HERON.—Plentifully distributed over the peninsula. There is a small heronry on the cliffs of Sybil Head. The majority of the birds observed in August were immature.

ANSERES.

Anser albifrons, Scop. WHITE-FRONTED GOOSE.—Observed a large flock near Smerwick Harbour on December 29th. Mr. King informs me that this species of goose is plentiful in winter.

Bernicla brenta, Pall. BRENT GOOSE.—Observed two flocks in Smerwick Harbour on December 29th. (The Brent Goose abounds in Tralee Bay, at the root of the peninsula.—(*Ussher*).

Tadorna cornuta, Gmel. SHELD-DUCK.—Observed a small flock on the sand-flats of Inch, close to Dingle Bay. (August 17th.)

Mareca penelope, Linn. WIGEON.—Observed flocks in the estuaries of Smerwick and Dingle in the winter. The peasants inform me that this duck is common all round the peninsula from October to March.

COLUMBÆ.

Columba palumbus, Linn. RING DOVE.—Observed a few near Dingle, but at the westerly end of the peninsula the species seemed to be absent.

C. livia, Gmel. ROCK DOVE.—Abundant, especially about Sybil Head. On the 21st August I obtained an adult male, in which the white patch over the tail was absent, its colour being taken by the bluish slate of the back. Tame "Blue Rocks" often exhibit this variation of plumage, but in as much as there were no doves for miles around the neighbourhood, it is unlikely that the specimen I secured was ever domesticated. It was shot in my presence by a farmer in a field at Dunmore Head, a few yards from the edge of the cliffs.

LIMICOLÆ.

Aegialitis hiaticula, Linn. RINGED PLOVER.—Plentiful about the low-lying coasts of the peninsula. Much more numerous in the winter, when I observed it also in small numbers *about the rocks* of Dunmore and Sybil.

Charadrius plumbealis, Linn. GOLDEN PLOVER.—Plentiful in the winter over the mountains and mud-flats. In December I have watched hundreds of them resting in the fields, chiefly in the middle of the day. They were particularly numerous if there was a full noon tide. They allowed me to drive past them within fifty yards, nor did they always take to the wing when I drew up in front of them. A field or two thickly peppered with Golden Plover standing at ease is a very impressive sight. As a rule, one comes suddenly on large flocks of them at a time when, perhaps, there is rather an absence of other bird life in the immediate neighbourhood. In August I failed to observe the Golden Plover, although I expect it breeds about the Dingle mountains.

Vanellus vulgaris, Bechst. LAPWING.—Plentiful in summer and winter. My friend Mr. King cites an interesting account of an attack between two Lapwings and two Peregrines, resulting in the sacrifice of life of a parent in defence of its young or eggs. A male Peregrine visited a small moor in which a pair of Lapwings were breeding. The latter descriing their enemy some distance off, flew

straight to meet him, and by their loud threats endeavoured to drive him away. But the ravenous Falcon was not to be thwarted, and whether sorely pressed with hunger or in order to procure food for his offspring, he turned on one of the Lapwings. The terrorised mate seeing the pursuit flew off. The hawk, having singled out his prey, dashed after it, swooping and turning so sharply that capture seemed inevitable. But after repeated attempts the hawk seemed unable to strike the Lapwing, and how long the pursuit would have lasted it is hard to say, had not a large female Peregrine suddenly swooped down, and with one sharp turn put an end to the chase by seizing the unfortunate bird and carrying it off. The male Falcon deprived of his quarry slowly ascended to a great height, performing a series of beautiful circling aerial movements. I presume the hawks were feeding young, so daring and persevering were they about the onslaught. (See Peregrine, p. 130.)

Streptilas interpres, Linn. TURNSTONE.—Plentifully distributed about the rocks and mud-flats.

Hæmatopus ostralegus, Linn. OYSTER-CATCHER.—Common in the same localities as the last species, with which it often kept company.

Gallinago cælestis, Fren. COMMON SNIPE.—Observed several in the winter about the marshes at Smerwick and Ventry. Sportsmen tell me this bird is numerous in autumn and winter.

Tringa alpina, Linn. DUNLIN.—Observed several flocks—none very large—on the mud-flats. More numerous in winter. I found the remains of several on the mountains, probably killed by Merlins.

Totanus calidris, Linn. COMMON REDSHANK.—Observed several both on the rocks and sand-flats.

Totanus canescens, Gmel. GREENSHANK.—Observed two in August, almost every day, flying from rock to rock at the point of the peninsula (Dunmore). I probably overlooked it in winter.

Numenius arquata, Linn. CURLEW.—Plentiful over the peninsula. On the 29th August I shot three Curlew from a flock in a ploughed field. Their gullets, mouths, and beaks were packed with wriggling earth-worms. These birds, which were immature, proved very edible.

N. phæopus, Linn. WHIMBREL.—Only observed one on the 30th August. It was resting on a rock near Dunmore Head. I have shot the Whimbrel east of Dingle at Calinafercy Bay.

CAVIÆ.

Sterna fluviatilis, Naum. COMMON TERN.—In August I frequently observed small flocks fishing round the point of the peninsula.

Larus ridibundus, Linn. BLACK-HEADED GULL.—Observed several both in winter and summer. On the 29th December I noted an adult bird, with a black head—*i.e.*, in summer plumage. There is a small breeding colony on a low island of the Basket group.—(Ussher).

- L. canus**, Linn. COMMON GULL.—Observed many, both in summer and winter. On the 20th August over thirty adults, in *full summer plumage* (i.e., with pure white heads), pitched in a field near Ballyferriter. These birds most likely crossed over from one of the Basket Islands, where there is a small breeding station. It is noteworthy that “this is the most isolated breeding resort of the species known in Ireland, as well as the *most southern in Europe*.”—(*Ussher*.)
- L. argentatus**, Gmel. HERRING GULL.—Plentiful all round the peninsula.
- L. fuscus**, Linn. LESSER BLACK-BACKED GULL.—Observed several at the end of the peninsula in the summer, but none in the winter. This bird breeds on the Basket Islands.
- L. marinus**, Linn. GREAT BLACK-BACKED GULL.—Observed five (two adult, three immature) between Sybil and Dunmore Heads, in August. This bird breeds on the Blaskets also.
- L. glaucus**, Fab. GLAUCOUS GULL.—On the 30th December I watched an immature Glaucous Gull in Dingle Harbour, near the town. The bird, as it sailed slowly past me, was so near that I could easily distinguish it from immature Herring or Black-backed Gulls, by the absence of black-tipped flight feathers. This Gull “has been repeatedly obtained on the north coast of Kerry.”—(*Ussher*).
- Rissa tridactyla**, Linn. KITTIWAKE GULL.—Observed many all round the peninsula in August. Did not notice any Kittiwakes in winter. It has large breeding colonies on the Blaskets.

ALCÆ.

- Alca torda**, Linn. RAZOR-BILL.—Numerous in summer in the deeper waters around the headlands of the peninsula. The vast majority of birds, young and old, had left the cliffs. “Multitudes of Razor-bills breed on the Blaskets.”—(*Ussher*). I did not observe this bird in winter.
- Uria trolle**, Linn. COMMON GUILLEMOT.—Plentiful in the deeper waters, where I observed them in company with Razor-bills. Observed none in the winter. Multitudes breed on the Blaskets.
- Fratercula arctica**, Linn. PUFFIN.—In August I observed several in the Sound between the end of the Dingle peninsula and the Blaskets. Many breed on the latter islands. I did not notice any Puffins in winter. I found fresh remains (feathers, a few bones, and beaks) of this and the preceding two species, on several occasions, near the cliffs of Dunmore. Peregrines had more than likely been at work.

TURBINARES.

- Puffinus anglorum**, Temm. MANX SHEARWATER.—Observed several off the cliffs at the end of the peninsula; also round the Blaskets, where there is a breeding colony. The Kerry peasants visit the breeding haunts, and kill and eat the Manx Shearwater. I did not notice this species in winter.

TABULATED LIST OF RARE¹ BIRDS WHICH HAVE OCCURRED ABOUT THE
NEIGHBOURHOOD OF DINGLE PENINSULA.²

No.	Name.	Locality.	By whom recorded.	Date.
1.	Yellow-browed Warbler.	Tearaght, . .	Barrington, . .	Oct. 14, 1890.
2.	Golden Orioles, .	Ventry, . .	E. M. (<i>vide Field</i> , June 4th, 1886). }	May 11, } 1881.
1.	Waxwing, . .	Milltown, . .		" 13, }
1.	Pied Flycatcher, .	Tearaght . .	Thompson, . .	Dec., 1849.
1.	Red-breasted Flycatcher.	" . .	Barrington, . .	Sept. 20, 1886.
1.	Mealy Redpoll, .	" . .	" . .	Oct. 20, 1890.
1.	" " . .	" . .	" . .	Sept. 19, 1889.
1.	" " . .	" . .	" . .	Sept. 14, 1890.
3.	" " . .	" . .	" . .	{ Sept. 25, 1892.
1.	" " . .	" . .	" . .	{ Sept. 26, 1892.
1.	" " . .	" . .	" . .	Oct. 18, 1892.
1.	" " . .	" . .	" . .	Nov. 15, 1893.
1.	Wood-lark, . .	" . .	" . .	Oct. 20, 1887.
1.	Lesser White-throat.	" . .	" . .	Oct. 1, 1890.
2.	Greenland Falcons,	" . .	See Migration Rep.	April 7, 1884.
1.	" " . .	" . .	" . .	April 21, 1884.
1.	" " . .	" . .	E. M'Carron, .	March 23, 1884.
1.	" " . .	" . .	" . .	April 2, 1884.
1.	" " . .	Castlemaine Bay,	A. J. P. Wise, .	1880—1887.
1.	" " . .	Tearaght, . .	E. M'Carron, .	April 16, 1890.
1.	Osprey,] . .	Tralee Bay, . .	Neligan, . .	Sept. 1870.
1.	" . .	Dingle Bay, . .	A. J. P. Wise, .	{ Aug., 1880.
1.	" . .	" . .	" . .	{ Nov., 1887.
1.	" . .	Killorglin, . .	—	March 2, 1895.
1.	Squacco Heron, .	R. Laune, . .	A. Bowles, . .	June 10, 1875.
1.	Glossy Ibis, . .	Tralee, . .	Neligan Collection,	Jan., 1865
1.	" . .	" . .	" . .	Oct., 1872.
5.	Spoonbills, . .	Dingle, . .	<i>Vide</i> "Thompson",	Febr., 1832.
2.	" . .	Castlegregory, .	" . .	Nov., 1846.
1.	Red-crested Pochard.	Tralee, . .	V. M'Cowen, .	Jan. 18, 1881.
1.	Eider Duck, . .	" Bay,	Chute Collection, .	1845-46.
1.	" " . .	Spa, Tralee, .	Neligan Collection,	Nov. 1864.
1.	" " . .	Ventry, . .	Williams & Son, .	Jan., 1900.
1.	Velvet Scoter, .	Tralee, . .	Neligan Collection,	—
2.	Smews, . .	" . .	" . .	—
1.	Hooded Merganser,	Dingle Bay, . .	Chute, " . .	1840.
1.	Spotted Crane, .	Tearaght, . .	<i>Vide</i> Migration Reports.	Aug. 21, 1887.
1.	Crane, . .	Tralee Bay, . .	<i>Vide</i> Thompson, .	1826.
1.	Black-winged Stilt,	Castlemaine Bay,	p. 132. <i>Vide</i> Thompson,	Previous to 1850.
1.	Temminck's Stint,	Tralee, . .	p. 445. Chute Collection, .	1848
1.	Iceland Gull, . .	Dingle, . .	Usher, . .	1891-92.
2.	Ivory Gulls, . .	Blennerville, .	" . .	Febr., 1846.
1.	Ivory Gull, . .	Tralee, . .	Neligan, . .	Jan., 1835.
1.	Great Skua, . .	Tralee Bay, . .	Chute Collection, .	—
Several.	Pomatorhine Skua,	" . .	J. C. Neligan, .	Oct. 25, 1862.
Several.	Richardson's Skua,	" . .	" . .	Oct. 25, 1862.
1.	Leach's Fork-tailed Petrel.	Tearaght, . .	F. J. Ryan, . .	June 23, 1887.
1.	" " . .	" . .	Barrington, . .	July 6, 1888.
1.	Sooty Shearwater,	Dingle Bay, . .	Andrews, . .	Aug., 1853.
1.	" " . .	Little Skellig, .	A. G. More, . .	—

¹ Birds, formerly common, now rare, are excluded.² The Tearaght Rock and Blasket Islands are here included.

The following is a list of birds of common occurrence and wide distribution, which, it is likely, I overlooked on the Dingle peninsula.

Field-fare.	Common Scoter.
Ring Ousel.	Red-breasted Merganser.
Golden-crested Wren.	Red Grouse.
Chiff-chaff.	Land Rail.
Sedge Warbler.	Water Rail.
Great Titmouse.	Moor-hen.
Coal Titmouse.	Coot.
Pied Wagtail.	Woodcock.
Spotted Flycatcher.	Jack Snipe.
Sand Martin.	Purple Sandpiper.
Lesser Redpoll.	Knot.
Reed Bunting.	Sanderling.
Night-jar.	Common Sandpiper.
Cuckoo.	Bartailed Godwit.
Long-eared Owl.	Arctic Tern.
Sparrow Hawk.	Little Tern.
Grey-lag Goose.	Black Guillemot.
Bewick's Swan.	Great Northern Diver.
Mallard.	Red-throated Diver.
Teal.	Great Crested Grebe.
Pochard.	Little Glebe.
Scaup.	Storm Petrel.
Golden-eye.	

From the foregoing list it may be seen that many common and widely distributed birds were overlooked. This could hardly be avoided, owing to the very limited time which I had at my disposal to spend on the peninsula. I made two short visits, one in the summer, during the latter three weeks of August, 1897; the other in the following winter, from December 26th to January 5th, 1898.

Although my second visit was much the shorter of the two, I observed more species at that time than in the summer; large numbers of winter migrants having made their arrival. These greatly exceeded in numbers the summer migrants which had departed.

Unfortunately, opportunity was not afforded me of exploring the district in mid-autumn, so that I cannot say that a few of the commoner species of passing autumnal migrants did not touch on the shores of the peninsula. Such birds as the Skuas, the Curlew Sandpiper, the Little Stint, and perhaps the Ruff and Black-tailed Godwit, may, at all events, be provisionally included in the avi-fauna of West Dingle.

Before concluding, I wish to convey my best thanks to Rev. W. J. King for much valuable information concerning the habits of the Chough, the Hen Harrier, the Peregrine Falcon, and other birds: information to be esteemed all the more because it has been derived from his own personal observations in the field.

To Dr. C. R. Browne, whom I accompanied during his ethnographical survey over the same district, I am also deeply grateful. From him I learnt several useful hints as to the best methods of exploring the wild, rugged, western part of the Dingle Peninsula.

University College, Sheffield.

REVIEW.

PREHISTORIC DOGS.

Die praehistorischen Hunde in ihrer Beziehung zu den gegenwärtig lebenden Rassen. Von DR. TH. STUDER. Zürich, 1901. (*Abhandl. der Schweizer Paläontol. Gesellschaft*, vol. xxviii.)

Recent and extinct races of Dogs have been carefully studied by Professor Studer, of Berne, for a considerable number of years. The Museum of Berne contains a large collection of Dog skulls, among which there are no less than 64 prehistoric ones, mostly from the Swiss lake-dwellings (*Pfahlbauten*). Particularly interesting are Professor Studer's researches into the origin of the domestic Dog. Whether the modern breeds have descended from one or more of the ancient wild Dogs, is a subject which has engrossed the attention of many a naturalist in bygone times. But never before has such an unrivalled collection of canine remains been at the disposal of a zoologist as that of the celebrated Swiss naturalist to whom we are indebted for the magnificent treatise just issued on the prehistoric Dogs and their relations with those now living.

The skull must be looked upon as the most characteristic portion of the body, and it is of the greatest importance in distinguishing the various races from one another. It forms, indeed, the basis of all researches upon the origin of the domestic Dog.

Professor Studer draws attention to the fact that the skull of the Wolf is extremely variable, perhaps more so than that of any other wild mammal, and that some of these skulls approach those of domestic Dogs very closely. A Dog's skull, however, can always be distinguished from that of a Wolf by the position and form of the eye cavities.

The various races of Dogs may be divided into two great groups, viz., the northern (Palæarctic) and the southern Dogs. The latter group includes Dogs which resemble the Paria, while all the remaining races fall readily under the various types of northern ones. These types are the Pomeranian, the Mastiff and allies, the Wolf hounds, the Hunting Dogs, and the Collie-like Dogs.

A skull found by the late Sir William Wilde in the great crannog or lake-dwelling of Dunshaughlin, Co. Meath, belonged, according to Professor Studer, to a variety of the Pomeranian Dog. A precisely similar form also occurs in the Swiss "Pfahlbauten," and is still living in Siberia at the present day.

Two other skulls, also found at Dunshaughlin, belong to the race of Irish Wolfhound, now probably extinct. They resemble similar skulls discovered in Swiss lake-dwellings, but are considerably larger and more powerful.

Lastly, in Lough Gur, Co. Limerick, a skull, now in the National Museum, was unearthed, which shows that there existed formerly in Ireland a third race of Dog related to the existing Collies. This also occurs in the Swiss lake-dwellings.

The difficult question regarding the ancestors of the various Dog races has been discussed by many competent zoologists, but their conclusions have differed very much. While some maintained that the domestic varieties have descended from one Pleistocene species of wild Dog, others have suggested that the Jackal and the Wolf were the ancestors of the modern breeds. Certain it is that Dogs crossed with Wolves and Jackals have produced fertile offspring.

Professor Studer's view is that the domestic races of Dog have descended from a wild Dog resembling the Australian Dingo, one variety of which gave rise to the southern breeds and another to the northern ones, and that races such as the northern Wolfhounds have been produced by primitive man by crossing this ancient Dog with the Wolf and by subsequent selection from the offspring.

R. F. S.

SOME LAND AND FRESHWATER SHELLS FROM CO. CLARE.

BY P. H. GRIERSON.

THE northern portion of Co. Clare, taking a line from Killaloe through Ennis to Lehinch, is very interesting from a conchological point of view, as most of the Irish species of Land and Freshwater shells are to be found there.

The geological formation is mainly divided between Lower Silurian, Old Red Sandstone, Carboniferous Limestone, Millstone Grit and shale—the limestone covering by far the greater area.

In the neighbourhood of Lehinch and Ennistymon I was very successful in my finds, especially near the junction of the Millstone Grit and shale. In it I found all the *Hyalinias* except *H. helvetica*—the rarest being *H. excavata*, which is to be met with in the glens near Ennistymon and Moy.

Of the *Helices*, *Helix rotundata*, *H. pygmaea*, and *H. nemoralis* are to be found nearly everywhere, but *H. rupestris* is confined to the limestone districts. I only found two specimens of *H. lamellata* in a wood near L. Inchiquin, among the leaves of *Luzula sylvatica*. *H. aculeata* I noticed in a few places between Lehinch and Corofin, and *H. pulchella* is common between Lehinch and the Cliffs of Moher. *H. aspersa* seems common where lime or limestone exists—either near limestone walls (close to houses, &c.), or in among the crags far removed from human habitations. *H. rufescens* I only took in the neighbourhood of houses or on the headlands of cultivated fields. *H. hispida* is common. *H. fusca* I met with in Ennistymon glen and also near Moy—in the former place I took several adult specimens in September, 1900, on a Beech tree, but on subsequent visits to the same place I could only find very young ones. *H. ericetorum* is very common nearly all over North Clare, and it greatly varies in size and appearance in the different localities. *H. caperata* occurred on the sand-dunes near Blackhead and also a few miles N.E. of Corofin. *H. virgata* is found at the last-named place and also at Aughanish. *H. acuta* I could only discover near Ballyvaughan and at Aughanish.

Buliminus obscurus is to be found at the foot of a limestone cliff under Ballynalacken Castle.

Pupa anglica is tolerably common in wet places between Lehinch and Corofin, while *P. cylindracea* is to be met with everywhere, and *P. muscorum* is plentiful in several places along the coast, especially at Lehinch.

Vertigo antivertigo is to be found on Bulrushes between Lehinch and Ennistymon. *V. pygmaea* is widely distributed, and *V. substriata* and *V. angustior* occur in wet moss on Lehinch sand-dunes. *V. edentula* can generally be obtained in damp woods where *Luzula sylvatica* is growing. *Balea perversa* is common on loose stone walls over the whole district, and it does not seem to have any partiality for any particular rock formation. *Clausilia bidentata*, *Cochlicopa lubrica*, *Succinea putris* and *S. elegans*, *Carychium minimum* are all common.

Planorbis fontanus was met with in a few places in the vicinity of Corofin. *P. nautilus* I found near Liscanor, Corofin, and Muckinish. *P. albus* near Feakle, Corofin, &c. *P. spirorbis*, *P. contortus*, and *P. umbilicatus* are widely distributed. *P. carinatus* I found in L. Derg.

I took *Aplexa hypnorum* near Feakle, Kilfenora, and Muckinish, and I discovered *Amphipeplea glutinosa* in March, 1901, in the Scariff canal by dredging.

Limnea peregra, *L. stagnalis*, *L. palustris*, and *L. truncatula* are widely distributed, and so is *Ancylus fluviatilis*. *Velletia lacustris* is fairly common about Corofin.

Hydrobia Jenkinsi is common in the salt marshes about Lehinch, and I obtained *H. ventrosa* in Muckinish Lough. *Acme lineata* I only found in one place, about 3 miles S.E. of Ennistymon—in wet moss. *Neritina fluviatilis* occurs in Loughs Derg, Inchiquin, &c.

Bythinia tentaculata occurs in many of the rivers and lakes, as also *Valvata piscinalis*, while *V. cristata* is to be found in many localities on the leaves of the Water-cress (*Nasturtium officinale*). As regards bivalves, *Anodonta cygnea* occurs in Loughanilloon, and *Sphaerium corneum* is common everywhere. I also found several species of *Pisidium*, including *P. fontinale*, *P. pusillum*, and *P. milium*, in the neighbourhood of Lehinch and other localities.

Clondalkin, Co. Dublin.

CHARACEÆ FROM COUNTY MONAGHAN.

BY REV. G. R. BULLOCK-WEBSTER, M.A.

No one can be a student of the Characeæ without becoming possessed of a strong desire to visit Ireland and explore its many lakes and bogs. For the last six years I have restricted my botanical studies to this order of plants, but it was not till last summer that I had an opportunity of carrying my desire into effect.

In August last I spent nearly a month in County Monaghan. Carrickmacross served as my headquarters, and from that centre, with the aid of a bicycle, I worked the district as well as the uncertain weather, and the somewhat rough nature of the roads, would permit. County Monaghan offered a double attraction, for, in the first place, the ordnance map indicated a county abounding in pools and lakes and watery localities, and, secondly, my census record of Irish Characeæ showed that that county had evidently not been worked with any thoroughness in pursuit of these interesting plants. My notes gave *Chara fragilis* Desv. as the only record for the county, but the *Irish Topographical Botany*, which Mr. Praeger was at the time passing through the press, and of which he was good enough to supply me with some advance sheets, gave in addition to this *Chara polyacantha* Braun, *Nitella flexilis* Agardh, and *Nitella opaca* Agardh.

A promising field seemed to lie before me, and I lost no time in setting to work. My first excursion was to Lough Rahans, some six or seven miles south of Carrickmacross, where, with the aid of a boat and a kind companion who did most of the rowing, I was able to make a careful investigation. We spent several hours on the water, and used both hoe and drag freely, but not a single *Chara* showed itself. It was the same in the neighbouring and larger lake, Ballyhoe, though that piece of water I was scarcely able to examine with the same care, owing to its large extent and the stormy weather which set in in the afternoon. Bursk Lough, hard by, we also visited, with a like result.

Ross Lough, five miles east of Carrickmacross, and in County Louth, was our next piece of water. Here the neighbouring ditches yielded *Chara fragilis*, and the remains of *Nitella opaca* or *flexilis*.

The lakes north and north-west of Carrickmacross, which I explored in succeeding days, yielded nothing more than these two species, often less. My notes record from Greagh-lone L. *Nitella opaca* (?), *Chara fragilis*, and *C. fragilis* var. *delicatula* Braun. These were growing near the shore. I was unable to secure a boat. From Cornalaca L. (hard by, but in County Cavan), *C. fragilis* and *N. opaca* (?); these were in deep water, very sparsely distributed.

From Shantonagh L. nothing. From Lisnakillewbane L. *N. opaca* (?). From Avattan L., where we secured a punt and dredged for some while, *C. fragilis* and *N. opaca* (?), both of which occurred also in shallow water, near the edge. Aphuca L., three miles north of Carrickmacross, yielded nothing in the shape of Characeæ, and Creevy L., a mile further on, only favoured me with some very fine *N. flexilis* (?). In none of these instances was I able to find any fruit on the *Nitellas* sufficient to indicate for certain their species.

Close round Carrickmacross itself I had better success. There is a small pool—it cannot be called a lake—south-west of the town, lying off the road which leads to Lough Fea. Here my drag, thrown from the banks, brought up *Chara hispida* Linn., *Chara vulgaris* Linn., and *Chara vulgaris* var. *longibracteata* Kuetz. Further dredging produced some fine specimens of *Chara polyacantha* and *Chara hispida* var. *rudis* Braun. But a great surprise was in store when I detected amongst the miscellaneous collection of water-weeds which the drag brought to land some small pieces of *Nitella mucronata* Kuetz. Diligent dragging produced some good specimens, and had it been possible to get a boat on the water, I do not doubt that I should have been able to collect much more. But Monalty L., a couple of miles eastward, where I had the advantage of a boat, yielded a magnificent supply of this rare *Nitella*. There appeared to be thick beds of it, which the drag came upon now and again, in some 4-6 feet of water. The plant was in magnificent condition, bright, clean, full of fruit, and considerably above the

ordinary size. The splendid harvest of such an uncertain and scarce species was a rich reward for much fruitless hunting.

Monalty L. yielded also *Chara hispida*, *Chara hispida* var. *rudis*, *Chara vulgaris* var. *longibracteata*, and *N. opaca* (?), whilst L. Naglack, which I also explored with the aid of a boat, yielded *Chara hispida* and *C. hispida* var. *rudis*, *Chara fragilis*, and *C. fragilis* var. *Hedwigii* Kuetz., *Chara contraria* Kuetz.; and one or two fine specimens of *Nitella mucronata*.

There are two small pools adjoining, and just south of, L. Naglack. These, with the neighbouring ditches, proved very rich in *Chara* vegetation, yielding, as they did, *C. polyacantha*, *C. aspera* var. *desmacantha* H. and J. Groves, *C. hispida*, *C. hispida* var. *rudis*, *C. fragilis* var. *capillacea* Braun, and *C. contraria*.

We also spent a day on Lough Sillan, County Cavan. This fine piece of water looked capable of yielding many treasures, but diligent search only produced *Chara fragilis*, *Nitella flexilis*, and (much more interesting than either of these) *N. flexilis* var. *nidifica* Wallm., growing sparsely with the type.

We only undertook two distant excursions. One was to Lough Neagh, where I was very anxious to collect the rare *Chara aspera* var. *lacustris* H. and J. Groves. I succeeded in getting some good specimens, aided by Mr. Praeger's kind directions, and also some excellent plants of *C. fragilis* var. *delicatula* Braun, which is abundant at the southern extremity of the lake.

The other excursion was to the Westmeath lakes, that I might see growing in its own home, and collect with my own hands, *Chara tomentosa* Linn. We were fortunate enough to hit on brilliant weather for our visit to Mullingar, and spent ten hours on Lough Owel, favoured with unbroken sunshine and an absolutely unruffled surface to the water. This enabled me to examine the submerged aquatics in a way which seldom falls to the lot of a botanist, and I detected what, I think, has not been observed in the lake before, *Nitella tenuissima* Kuetz., growing in fine condition in 4-6 feet of water in some abundance. Three very distinct forms of *Chara contraria* were prevalent, as well as abundance of

C. fragilis and its var. *delicatula*, *C. hispida*, *C. aspera* subsp. *desmacantha*, *C. tomentosa*, of course, and, very sparsely, *C. polyacantha*.

One point of interest seems worth mentioning. Several of the streams in the locality of Carrickmacross, where the Characeæ yield is richest, showed along their banks, under a thick bed of black peat, a substratum of white shell-marl of considerable thickness. The same occurrence is frequent in our fen-lands of Cambridgeshire, and in the *Memoirs* of the Geological Survey for Cambridgeshire and Suffolk (Fly, Mildenhall and Thetford Section), there is an interesting discussion on the characteristics of this shell-marl and its origin. "The greatest thickness," writes Mr. Skertchley, "is three and a quarter feet, but for more than two square miles it is not less than two feet. The pure white of the marl, and the dark colour of the overlying and underlying deposits, makes the sections very striking. Not a stone or patch of clay, or other foreign matter, can be found, and the fresh-water shells seem to be pretty constant throughout. The mass is jointed so as to form large lozenge-shaped masses, and the main joints are very regular. The roots of *Chara* can be seen in it, and the seeds obtained by careful examination. Indeed, I have no hesitation in attributing the formation of the shell-marl to the decay of *Chara* of various species. These plants are still living in the neighbouring dykes, where, so far as my observation goes, they form dense masses, to the exclusion of other plants. The axes of two species, *C. vulgaris* and *C. hispida* are encrusted with carbonate of lime. . . . This forms a deposit at the bottom of the water. One season's deposit is usually only a white stain, but under exceptional circumstances an appreciable thickness is formed." If Mr. Skertchley's theory be correct, the deposits of shell-marl round Carrickmacross indicate extensive tracts of water in the neighbourhood abounding in Characeæ. Probably many of the lakes covered a much larger area than at present, and the deposit of shell-marl marks their original extent.

In brief, then, my visit resulted in proving that Monaghan is not behind other Irish counties in the number of Characeæ which it yields, and that it possesses one species not so far recorded from Ireland—*Nitella mucronata* Kuetz., while the

occurrence of *N. flexilis* var. *nidifica* Wallm., in the neighbouring County of Cavan adds a third to the two Irish records which Mr. Praeger was able to chronicle in 1900.

A word about these two plants. The variety *nidifica* was first recorded for the British Isles in 1882, when Mr. Sturrock found it in Marlee Loch, East Perth. Since that year there has been no other record of it till Mr. Praeger collected it two years ago in Roscommon and Monaghan. It has never so far been observed in England. The yield in Lough Sillan was small, but I was able to gather sufficient to make eight or ten sheets of it.

Nitella mucronata was first collected in the British Isles in the early part of the last century by Mr. Borrer in Sussex. It was not till some seventy years later, in 1882, that it was again observed—this time in the Ouse, at Bedford, by Mr. C. H. Davies and Mr. James Saunders, and Mr. Saunders has since found it in the river Ivel in the same county. In 1892 Mr. Druce found it in abundance in a ditch at Godstowe, Oxfordshire. Four years later I collected some few specimens in a clay pit at Ely, Cambridgeshire, and in the following year found one solitary plant in the river Little Ouse, Norfolk. Mr. Boswell's herbarium shows it to have been collected (but not at the time recognized) in Fleet Pool, Hampshire, in 1873. It has been recorded from no other county in the British Isles. Its distribution outside the British Isles is wide. It is recorded from Germany, Austro-Hungary, Russia, Switzerland, Scandinavia, Denmark, Netherlands, Belgium, France, Portugal, Italy, Roumania, and Turkey.

One word of warning to my brother botanists. Do not be disappointed if the waters round Carrickmacross yield not a single specimen of *Nitella mucronata* next season. It is one of the most fugitive of our Characeæ. I think I am right in saying that it has never been collected a second time from those stations which I have quoted above. L. Monalty could have supplied the proverbial cart loads of it last August, but it is more than probable that many years may elapse before a single plant appears there again.

I must not fail to express a word of appreciation of the kind consideration extended to me during my visit. To do any careful work amongst the Characeæ a boat is indispensable.

Wherever a boat was available it was always placed at my disposal, and that with a cheery readiness which made the kindness seem the greater. Nay, further, if anyone had no boat of his own to lend he was more than ready to lend his neighbour's! But even with this welcome assistance many waters proved inaccessible, and many lakes outside our reach. There is much work to be done still amongst the Characeæ of County Monaghan.

The Palace, Ely.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

On the 20th May, the new "Roberts" House for Lions and Tigers was opened by the Lord Lieutenant in the presence of a large company including many Officers of the German Fleet.

Recent gifts include five Toads from Mr. H. Waterhouse, a Badger from Mrs. Burns Lindow, a Gannet from Mr. Prescott, a White Badger from the Marquess of Winchester, a Great Crested Grebe from Mr. W. P. H. L. Vaughan, and a Sooty Monkey from Mr. D. A. Donovan.

DUBLIN MICROSCOPICAL CLUB.

MARCH 12.—The Club met at Leinster House.

MR. GREENWOOD PIM showed sections of the extremely rugose lip of the Orchid *Pleurothallis Razli*, shown by Mr. Moore at the last meeting. The rugosity was seen to be due to prolongation of the epidermal tissue into a kind of pyramids resembling mountains, as drawn on a physical map, or the peculiar texture of a Shetland wool shawl. Scattered about through the substance of the lip, which was nearly cylindrical, were small masses of cells with thickened walls, the thickening taking a scalariform pattern—a very unusual type of cell except in the ferns.

MR. MOORE showed flowers of *Pleurothallis astrophora*, a very rare and diminutive Orchid. The flowers are very minute and have a peculiar lustrous appearance due to the presence of empty cells, which protrude above the cells containing coloured sap on the inner surface of the segments.

MR. CARPENTER showed a new species of Collembolan collected in the Antarctic Continent (Geikie Land) by the Newnes-Borchgrevink Expedition.

BELFAST NATURALISTS' FIELD CLUB.

APRIL 22.—THIRTY-NINTH ANNUAL MEETING. Mr. F. J. BIGGER, M.R.I.A., presided. Having opened the meeting, he called on the Secretary to read the annual report, giving statement of work done during the past year. The Treasurer (Mr. W. H. PHILLIPS) submitted a statement of the finances of the Club. It was proposed and seconded that these reports be adopted and that these and the reports of excursions and meetings should be published and circulated among the members. Mr. S. A. Stewart then read the awards on the collections sent in in competition for the prizes offered by the Club. The prize for Coleoptera was awarded to Mr. H. Lamont Orr, who presented two hundred and six named species of beetles collected in the district. These were excellently prepared and mounted, and were considered the best collection ever sent in for this prize. The prize for a collection of Liassic fossils was awarded to Mr. James Orr, whose collection included a number of the rarer forms. The reports of work done in the botanical section and geological section were taken, and the report of the Committee investigating the flora and fauna of Lough Neagh was read by Mr. R. Welch. The election of officers and Committee for the coming year was then proceeded with. The Secretary then read the rules regulating the constitution of the Club. Mr. W. J. Fennell proposed that the rule relating to the office of President should be suspended for the year, and that Mr. Bigger be requested to retain the presidency for another year. This motion was seconded by Mr. John Dickson and passed. Mr. Fennell was elected Vice-President on the proposition of Mr. J. Vinycomb, seconded by Mr. Welch. Mr. W. H. Phillips was elected Treasurer; Mr. Donaldson was elected Librarian; Mr. James St. J. Phillips and Mr. Robert Patterson were elected Secretaries. Mr. Coulson proposed and Mr. Foster seconded ten names to act as Committee, and the motion was passed. Members were then invited to bring forward particulars of places that would in their opinion prove of interest as summer excursions. A general discussion took place on the merits of the various places suggested, and a long list was left in the hands of the new Committee to select from. The Secretary called attention to the number of prizes offered by the Club for competition among the members, and read a communication from the Library and Technical Committee offering two valuable prizes for the best sets of specimens of building stones found in Ireland. A discussion arose as to the wide area and short time allowed for the collection to be made, and the matter was referred to the Committee to draft the necessary conditions. The Secretary read extracts from the report of the corresponding societies of the British Association.

The election of eight new members brought the meeting to a close.

CORK NATURALISTS' FIELD CLUB.

APRIL 24.—ANNUAL MEETING. Mr. THOMAS FARRINGTON, M.A., President, in the chair. The report was read by Mrs. E. B. HUGHES, retiring Secretary. The committee have to report a slight falling-off in membership. The membership for the year stood at 52. That, with 11 honorary members, makes a total of 63, as against 70 last year. The excursions this year were, on the whole, badly attended. Seven were arranged for, but three fell through, on account of non-attendance, and the Field Union excursion, which made the eighth, was, as far as Cork was represented, unsuccessful. On this account it was thought advisable to drop the other excursions advertised. The excursion to the Queen's College was well attended; so also was the one to Baltimore, and the one to the Ovens. The committee again complain of the want of enthusiasm among the members. Numerous prizes were offered for different collections, but there were no entries for competition. There is also a small collection of scientific books for the use of members of the C.N.F.C., but only one book was borrowed throughout the year. During the winter half of session two lectures were given, one by Dr. Pethybridge, on "Plant Habits," and the other in conjunction with the Literary and Scientific Society, by Mr. J. L. Copeman, on "Our Native Birds." Both were well attended. The balance-sheet is the most satisfactory part of the Field Club. The amount received in subscriptions was £24 or. 10d. The working expenses of the club amount to £10 17s. 6d., leaving a balance in hand of £13 3s. 4d. The committee regret very much the loss of one of their past Presidents, Mr. W. H. Shaw, B.E., J.P., who was always an active member and took great interest in all matters pertaining to field club work.

After the adoption of the report and balance-sheet had been carried, the election of officers took place as follows:—President, Professor Marcus Hartog, M.A., D.Sc.; Vice-Presidents, Thomas Farrington, M.A., J. L. Copeman, R. A. Phillips, Miss H. A. Martin, M.R.C.P., J. H. Bennett, H. H. Lund; Treasurer, W. B. Lacy; Secretary, John L. Copeman; Curator, William H. Johnson; Committee, F. R. Rohu, W. Coulthard, B.Sc.; J. Noonan, F. W. Moore, Mrs. E. B. Hughes.

After the suspension of the Standing Orders had been passed, it was agreed that the 5s. subscription now due be for two years instead of one, as owing to the Exhibition it would not be wise to attempt much during the present summer. After some discussion as to sessional arrangements, the meeting closed.

MAY 15.—Mr. JAMES PORTER, B.E., lectured on "Geographical Evolution in County Cork."

This lecture gave an account of some recent inquiries regarding the origin of the main river-valleys.

NOTES.

BOTANY.

Mosses New to Ireland.

The following two mosses appear to be additions to the Irish flora; both are rare in Great Britain :—*Dicranella curvata* (Hedw.) : on rocks in a narrow, deep, little glen on the south of Nephin Mountain, County Mayo, 1901, Lett and M'Ardle; and *Hypnum umbratum*, Ehrh : associated with, *Scapania ornithopodioides* and *Mastigophora Woodsii*, on Slievemore, Achill Island, County Mayo, 1901, Lett. This is a new station for these two Hepatics, for which hitherto the only Irish localities were in County Kerry.

H. W. LETT.

Aghaderg, County Down.

Peat Bricks.

Apropos of Mr. Welch's note on "peat bricks," I think he is under a misapprehension in considering the use of peat for indoor walls as a species of jerry-building. Under some circumstances sods of turf or peat are most economical and desirable for indoor walls. A wall of peat is light in weight; it deadens sound, and (in most parts of Ireland) it is inexpensive. It is also a perfectly dry wall, if the peat is properly dry when put in. I know of two good old houses in County Dublin where the walls between the bedrooms are of peat, and one new house, built eight or ten years ago, where the inside walls of the upper storey are of the same material. Where an inexpensive, light-weight material, which is a non-conductor of sound is desired, peat might be much more used.

J. E. PALMER.

Dublin.

Puget's Herbarium.

Botanists who have made a study of the plants of the Alps about la Hte. Savoie et Valais, will be familiar with the Memoirs of M. Puget on the flora of the mountain range between Bonneville and Sallanches, and of the Region about Annecy.

M. Puget's herbarium was sold, it is believed, between 1872 and 1878 to "un collectionneur habitant un chateau en Irlande." No information can be obtained as to the owner of the chateau or of the Herbarium, but in the interests of botanists, such information is earnestly desired, and may be addressed to M. Gustave Beauverd, Herbarier Boissier, Chamblé, Switzerland, or to

E. P. WRIGHT.

5, Trinity College, Dublin.

ZOOLOGY.

Late appearance of *Vanessa io*.

The Rev. C. L. Garnett, of Ardrea, Co. Tyrone, captured a Peacock Butterfly in the churchyard at Tynan, Co. Armagh, on November 27th, 1901. Not having a net he captured the butterfly with his hat, and brought it to me very little the worse of such a rough and ready mode of capture.

W. F. JOHNSON.

Poyntzpass.

Bombylius canescens.

I have been interested by Col. Yerbury's account of the habits of this fly (*supra*, page 77), because some years ago I made some observations on *Bombylius* in the same direction as the Colonel—*i.e.*, to ascertain upon what Hymenopterous genus it was parasitic.

Early in June, 1896, I took several specimens of a *Bombylius*, probably *canescens*, in a gravel pit at Sandyford, Co. Dublin. These were all females. When taken they were hovering near the nests of an *Andrena* (*A. nana*) and a *Sphecodes* (*S. subquadratus*). I did not see them enter the burrows of these bees as *Volucella* enters the nests of *Bombus*, but they frequently alighted for a moment at the entrance of the burrow, when the bee had passed in. Several *Halicti* (*morio*, *subfasciatus*, &c.) had their burrows in the neighbourhood, but I did not observe any *Bombylius* near them. But in July, 1897, I captured several *Bombylii* in Stillorgan Park about the burrows of *Halictus rubicundus* and *H. villosulus*. So I conclude they are somewhat promiscuous in the matter of hosts.

H. GORE CUTHBERT.

Dublin.

Owl *v.* Starling.

The other evening I heard a tremendous row going on in the ivy on the gable of this house. At first I could not make out what it was, but on listening, I recognised the cry to be that of a Starling. I ran round to see what the matter was, and on turning the corner of the house saw an owl fly out from the ivy; I could not be sure of the species, but as well as I could judge by the light of the lantern I was carrying, it was a Barn Owl. Immediately after the retreat of the owl, a Starling fluttered down. I followed, picked it up, and found it bleeding from its bill and very weak. I placed it in safety on a window-sill, and as it was nowhere to be seen in the morning, I conclude it recovered from the effects of its fight. I was not aware that an owl would attack as large a bird as a Starling, and though it would be quite able to overcome the resistance offered by the Starling, it did not in this case return to the attack, for I kept a look-out, and the owl has not returned.

W. F. JOHNSON.

Poyntzpass.

Magpies fishing for Eggs.

While walking across the fields here I noticed a couple of Magpies at a pond which my ducks frequent. I walked towards the pond, and on reaching it saw an egg on the bank; the Magpies had broken a hole in it and commenced to suck it, but what astonished me was to find that the egg was quite wet, and had evidently been taken out of the water, which was quite shallow. Looking into the water I saw another egg, and from other appearances I judged that the Magpies had been trying to get it out also. I always looked upon the Magpie as a very clever bird, with a most astonishing faculty for keeping out of range of an ordinary gun, but I never imagined that it would venture into water in the manner described above.

W. F. JOHNSON.

Poyntzpass.

Summer Migrants.

On the night of 5th inst. the wind shifted for the first time this Spring to east, and on the next morning I noticed a large number of migratory birds in this neighbourhood, including Sand-martins, Chiff-chaff, Willow wren, and on Monday following the Swallows were numerous. The Willow Wren and Chiff-chaff have been since heard repeatedly. The Wheat-ear was seen by me on 24th March, and yesterday I heard a Sedge-warbler in full song on the Nenagh river. The latter is an early record for this locality.

MICHAEL GLEESON.

Nenagh.

Woodcock breeding in Co. Donegal.

I have just had pointed out to me by one of my labourers a Woodcock's nest, the bird rising from her four eggs when I was within a couple of paces of them. Not many spots could readily be found more suitable to this and other birds of similar habits, and I have hopes that they will continue to make it their breeding place.

W. E. HART.

Kilderry, Co. Donegal.

Iceland Gull at Londonderry

On 7th April I saw an Iceland Gull (*Larus leucopterus*) at the Quay, Londonderry. It was flying about with the usual crowd of Herring Gulls that frequent the river. It seemed to be an immature bird.

D. C. CAMPBELL,

Londonderry.

NEWS GLEANINGS.

The British Association at Belfast.

Arrangements for the coming Meeting in Belfast, Sept. 10th, 12th, and 17th, are being actively pushed forward. The President-elect is Professor Jas. Dewar, F.R.S. The officers of the Natural Science Sections are as follows;—

C. Geology.—President, Lieutenant-General C. A. M'Mahon, F.R.S. Vice-Presidents, John Horne, F.R.S.; Professor J. Joly, F.R.S.; G. W. Lamplugh. Secretaries, Herbert L. Bowman, H. W. Monckton (Recorder), J. St. J. Phillips, H. J. Seymour.

D. Zoology.—President, Professor G. B. Howes, F.R.S. Vice-Presidents, Professor R. O. Cunningham, Professor J. Cossar Ewart, F.R.S. Secretaries, J. Graham Kerr, (Recorder), Robert Patterson, J. Y. Simpson, D.Sc.

E. Geography.—President, Colonel Sir T. H. Holdich. Vice-Presidents, Dr. J. Scott Keltie, H. J. Mackinder, Dr. H. R. Mill. Secretaries, G. G. Chisholm (Recorder), Edward Heawood, A. J. Herbertson, Ph.D.; A. Lindsay.

H. Anthropology.—President, Professor A. C. Haddon, F.R.S. Vice-Presidents, W. Crooke, Professor D. J. Cunningham, F.R.S.; Professor J. Symington, M.D. Secretaries, R. Campbell, Professor A. Francis Dixon, D.Sc.; J. L. Myres, M.A., F.S.A. (Recorder).

I. Physiology.—President, Professor W. D. Halliburton, F.R.S. Vice-Presidents, Professor J. G. M'Kendrick, F.R.S.; Professor E. Waymouth Reid, F.R.S.; Dr. J. Lorrain Smith, Professor W. H. Thompson, M.D. Secretaries, J. Barcroft, W. A. Osborne, D.Sc. (Recorder); Dr. Cecil Shaw.

K. Botany.—President, Professor J. Reynolds Green, F.R.S. Vice-Presidents, Professor I. Bayley Balfour, F.R.S.; Professor F. W. Oliver, D.Sc.; A. C. Seward, F.R.S. Secretaries, A. G. Tansley, Rev. C. H. Waddell, Harold Wager (Recorder), D. H. Yapp.

It is to be hoped that naturalists throughout Ireland will do their utmost to make the gathering thoroughly successful and enjoyable.

The Belfast Natural History Society's Museum.

We are glad to learn that a special effort is being made to improve and enlarge the natural history collection of this old and valuable Museum. A special fund has been started by Mr. Robert Patterson to enable the Society to acquire what fresh specimens may be necessary and make a satisfactory arrangement of the whole series. Contributions have been received from several leading Belfast citizens, but £100 more will probably be wanted. Subscriptions may be sent to Mr. Robert Patterson, at the Museum, College-square North; Mr. Patterson having kindly undertaken to act as treasurer for this special restoration fund, as well as to give his services and his skill in helping forward the rearrangement and renovation of the collection.

GEOGRAPHICAL EVOLUTION IN CORK.

BY J. PORTER, B.E.

[Read before the Cork Naturalists' Field Club, May 15th, 1902.]

THE greater portion of the county of Cork presents a stage of downward erosion, at which a fairly close correspondence has been developed between the larger surface features and the underground rock-structure. The more or less obdurate Coal Measures, which would have interfered with this development, have been practically wiped out all over the district to the south of the Blackwater. The sandstones and slates belonging to the Old Red series are overlaid by Carboniferous beds, which are generally of a less enduring nature, being either shaly slate to the south or almost pure limestone to the north. The close east and west folding which these rocks underwent during the Hercynian movements, has led to the production of a set of alternately resisting and enduring cross-country belts, formed by the bevelled edges of the exposed strata. The main drainage trunks tend to occupy the synclinal Carboniferous belts, their tributary streams seaming the flanks of Old Red Sandstone ridges between.

Both geologists and ordinary observers have long since noticed the peculiar easterly drainage of the longitudinal valleys. Their contained waters are in every case led southwards through narrow courses before the sea is reached, although the broad Carboniferous straths are continued to the east without break. The first attempt to afford an explanation of the southerly diversions on Huttonian principles was made by Jukes. He describes the facts of the case at Cappoquin, on the Blackwater, with all his accustomed clearness, in the *Explanation* to Sheets 176 and 177, p. 8 (date 1861). He reviews the evidence regarding underground disturbance as a diverting cause, and decides unhesitatingly against it (p. 13). The explanation which he framed, and which was suggested by the junction of the Brinny with the Bandon (*Expl.* to Sheets 194, 201, 202, p. 12), was fully worked out in his classical paper "On the Mode of Formation of some River-valleys in

the South of Ireland"—*Quart. Journ. Geol. Soc.*, 1862, p. 378. He postulates an original land-surface of Carboniferous rocks high above the present one. He seems to assume that the well-marked contortions which affect the rocks now accessible to observation died out towards the top, and left a plane sloping gently to the south, and still more gently to the east. Whether the plane might have been an unwrinkled surface of deposition or a peneplain it is not necessary to discuss. Granting the existence of such a surface, the earliest streams would naturally flow from north to south. As time went on, these would maintain their right of way if, as is probable, they retained sufficient fall; but the east and west geological structure would lead to the formation and extension of large tributaries in the softer belts, whose waters would be trapped by the primary valleys and carried to the sea, as at present.

It is not surprising that an explanation of such simplicity and beauty should have held its ground for so long. The hypothesis of underground movement, which had been rejected so decisively by Jukes in 1861, was put forward by Hull in 1878 (*Phys. Geol. and Geogr. of Ireland*, first ed., p. 177). His reason for not accepting Jukes's explanation was the non-coincidence between the northern streams and the southern diversions. But such a reason is of no weight in the case. Rivers do not mark time in that fashion. Every water-gap tends to travel with the stream, owing to the erosion of its upper off corner. The tendency at Cappoquin, for example, would be for the southern ravine to shift slowly to the east, as the waters flowing from the west would impinge with special force on the north-eastern corner of the bend. Geologists, however, seem to have received Hull's criticism with indifference, judging by the estimate which is still set on Jukes's great paper.

There were certain difficulties of detail which I encountered while engaged in the task of re-constructing the original land-surface of the south of Ireland. These difficulties led me to attempt the modification of Jukes's explanation of the river courses. Although the attempt was not successful, I did not lose faith in his theory as a general explanation, even when I discovered at the end of 1899 that the present junction of the Bandon and Brinny at Dowladaniel Castle had been effected

during glacial times. Shortly afterwards I met with Carvill Lewis's observations on the Lee and Blackwater ("Glacial Geology of Great Britain and Ireland," p. 139). He says:—

"It is clear that the River Lee in glacial times flowed from Queenstown Junction by Middleton to Youghal, as an open drift-filled valley runs that way. A somewhat similar explanation suggests itself for the remarkable course of the Blackwater from Cappoquin to Youghal."

The case, however, did not seem so clear to a local student as to the distinguished American glacialist; and I did not give up Jukes's theory until further evidence was forthcoming. I have recently found that the pre-glacial bed of the Lee has been eroded in rock at the city of Cork to a depth of 66 feet below the present ordnance datum, while the rock-sill of the present exit of the river at Roche's Point, 14 miles further down, is only 3 feet lower. It is obvious from these facts that the river could not have taken that course in pre-glacial times.

The construction of a contour map of the country by means of the dotted altitudes on the six-inch sheets, recently put me on the track of some fresh diversions of the east Cork rivers, which I have been able to verify. The upper Lee pursued a pre-glacial course along the route of the present Macroom Railway through the broad valley of the Bride, instead of its present constricted course by Carrigadrohid, Coachford, and the ravine of Inniscarra to the point where it now joins the Bride. The Bandon originally turned due east at Dunderrow, 5 miles above Kinsale, following a broad strath which leads past Belgooly to Ringabella Bay. The Owenboy, which now pursues an easterly course to Carrigaline, formerly consisted of an eastern and a western trunk, which united at Fivemile-bridge and flowed southwards to join the Bandon at Belgooly. The pre-glacial course of the Argideen lay to the west of Clonakilty into the bay south of the town.

The cause of the diversion has been the same in all cases. Great masses of drift were deposited in the original straths; and the waters, thus dammed back, accumulated to form lakes, which found exits over neighbouring wind-gaps. The obstructing masses of drift are easily traced in every case. The Blackwater was blocked by the deposits of glaciers from the Knockmealdowns as Carvill Lewis suggested. The Lee,

the Bandon, the Owenboy, and the Argideen owed their diversion to the ice-sheet from the north-west, which was resolved on its eastern edge into a series of lobes occupying the main straths. It may be here mentioned that the eastern limit which Lewis places on the Cork ice-movement, is not at all in accordance with the local evidence.

The temporary lakes which were formed by the damming of the rivers, underwent extensive silting-up in their upper reaches before they were drained by the cutting down of their outlets. The connection of the broad platforms of sand and gravel with the rocky ravines which have been excavated by the rivers since the glacial period, is usually made clear by a study of the altitudes at which the erosion contours change their slope or give place to contours of deposition.

There are some other points connected with the Cork valleys which I hope to discuss at an early date.

Moanarone, Bandon.

NOTES ON THE KERRY FLORA, 1901.

BY REGINALD W. SCULLY, F.L.S.

HAVING made a longer stay than usual in Kerry last year and spent most of my time in the neighbourhood of Killarney, I was able to give that portion of the county a more thorough examination. The results showed the botany of Kerry to be by no means exhausted even in so well known a district. Several discoveries were made, the most unexpected being *Teesdalia nudicaulis* R. Br., a plant hitherto believed to be restricted to the vicinity of Lough Neagh. The more interesting among the plants observed are set forth in the following list. Two Hawkweeds, which are still under examination, will probably turn out to be forms new to the Irish Flora.

In the following notes, plants followed by I. are additions to District I. of "Cybele Hibernica," 2nd Edition; those followed by 1 or 2, additions to the Kerry sub-divisions of "Irish Topographical Botany."

Teesdalia nudicaulis, R. Br.—I. 2. Sparingly near Killarney; I think it more prudent not to particularise the locality. It seemed native, and grew among native plants, though introduced trees and ornamental shrubs were not far off. This discovery extends the range of *Teesdalia* from N.E. to S.W. Ireland. When growing sparingly, as here, it is a very easy plant to overlook.

Cerastium tetrandrum, Curtis.—On shore of Lower Lake, Killarney, near Mahony's Point: rare inland.

C. semidecandrum, Linn.—With the above. An extremely rare plant in inland stations in Ireland. With *Silene maritima* and *Armeria maritima* it forms an interesting little group of plants, usually maritime in Ireland, which still hold their own about the Lower Lake, Killarney.

C. arvense, Linn.—2. Sparingly near Mahony's Point, Lower Lake, Killarney: the second Kerry locality.

Sagina subulata, Presl.—At about 1,200 feet on the southern shoulder of Beeown Mountain, near Sneem (N. Colgan and R.W.S.).

Spergularia rubra, Presl.—1. A *Spergularia* gathered by Mr. A. Somerville beside a wall, Knightstown, Valentia, is thought by Messrs. Ar. Bennett and J. Groves to belong to this species: this is the first record for Kerry.

Potentilla procumbens, Sibth.—2. Killarney; probably overlooked in 1.

Alchemilla vulgaris, Linn., *c. filicaulis* (Buser).—Beeown Mountain near Sneem; Loo Bridge; this is the only segregate that has so far come under my notice in Kerry.

Saxifraga stellaris, Linn.—Descends to less than 450 feet on the west slopes of the Reeks in Cottoner's Valley; this is the lowest record I know of in Ireland.

†*Gallum Mollugo*, Linn.—I. 2. Two or three patches in the West Park, Killarney. Archdeacon Wynn tells me he has known this plant for several years past in the Workhouse grounds.

****Petasites fragrans***, Presl.—2. Several localities about Killarney, Tralee, &c.; widespread throughout the county.

Cnicus arvensis, Hoffm. var. ***setosus*** (Bess.).—Muckross demesne, Killarney (N. Colgan and R.W.S.).

Hieracium cerinthiforme, Backh.—I. 1. Beeown Mountain, near Sneem (N. Colgan and R.W.S.); Gap of Dunloe, &c. 2. Horse's Glen, Mangerton. Most of the *H. anglicum* forms from the Kerry mountains seem referable to this variety.

****H. sclaphillum***, Uechtritz.—I. 2. I have known this Hawkweed for several years as a garden weed in a neglected rocky flower-bed near the Spa, Tralee. I have little doubt it was originally introduced with imported flower seeds.

H. gothicum, Fries.—1. Roughty River, about Morley's Bridge; new to Kerry, and not seen recently elsewhere in District I.

- H. rigidum**, Hartm.—I. 2. Poulgorm rocks and bridge, Clydagh Valley; hitherto recorded from Fermanagh and Donegal only. Two other *Hieracia* forms are still under examination: one seems to come near to *H. Zetlandicum*, Beeby; the other, which I thought to be a form of *H. boreale* Fries, is considered by the Rev. E. F. Linton to belong rather to one or other of the groups *Alpestris* or *Foliosa*. I hope to hear more about these plants later on.
- Gentiana campestris**, Linn.—More abundant about Killarney, &c., than I had thought. *G. Amarella* is still unrecorded for the county.
- Myosotis palustris**, With. var. **strigulosa**, Reichb.—Home Park, Killarney.
- Lithospermum officinale**, Linn.—2. Abundant over a very limited area on the lake shore in the Home Park, Killarney. This is the only Kerry station known to me.
- *Verbascum virgatum**, Stokes.—Several plants near a bridge, about two miles east of Kenmare. Mackay recorded this plant as occurring nearly a hundred years ago near Kenmare.
- Euphrasia** forms.—The Rev. E. S. Marshall finds the following forms among my gatherings—
- E. brevipila**, Burnat and Gremli—Abundant in damp meadows, &c. This seems the commonest form about Killarney.
- E. curta**, Fries, var. **glabrescens**, Wettst.—Beeown Mountain, Sneem, abundant and reaching to the summit, *circa* 2,450 feet; Black Valley, &c. One or two other forms are not yet named.
- Scutellaria Nicholsoni**, Taubert (*S. galericulata* × *minor*).—Damp wood south of Kenmare.
- Atriplex hastata**, Linn.—I. 2. Kenmare and Killarney; seems rarer than *A. patula*, but no doubt previously overlooked.
- ‡**Polygonum sagittatum**, Linn.—Though no new station has yet been discovered for this American annual, it shows no sign of dying out in its original locality. The warm summer of last year appeared to agree with the plant, and it was larger and more abundant than I have hitherto seen it.
- ‡**Salix pentandra**, Linn.—The brackets should be removed from the Kerry records for this willow in both *Cyb. Hib.* and *Top. Bot.* It is certainly thoroughly established about Castlecove and Sneem, though still only deserving a * or ‡.
- *Allium triquetrum**, Linn.—In abundance, as an escape, in a wood near the Park House, Killarney.
- ‡**Juncus glaucus**, Ehrh.—I. A few tufts on the railway line at Kilgarvan Station. This is the only locality so far known to me in South Kerry, and a most unsatisfactory one; it probably only deserves a * here.
- Potamogeton obtusifolius**, Mert. and Koch.—Pond east of Farranfore; the second Kerry locality.

- Carex Bœnninghausiana**, Weihe.—Sparingly in the Home Park, near Ross Castle, Killarney; the second Kerry and third Irish locality or this plant.
- C. curta**, Good.—Abundant in a swamp near Toormore, some miles N.E. of Killarney.
- ‡ **Poa nemoralis**, Linn.—Growing in dense masses near the stables, also more sparingly nearer the Deenagh River, Home Park, Killarney. I have not yet seen this grass in any of the old unplanted woods about Killarney so I am afraid this plant must rest, for the present at least, under grave suspicion of introduction.
- * **Bromus erectus**, Huds.—I have noted at intervals for the past twelve years one tuft of this fine grass growing in a meadow beside an old avenue at South Hill, Killarney. It has shown no tendency to spread during this period, nor have I been able to find it elsewhere in the county.
- B. racemosus**, Linn.—2. Near Doo Lough, Muckross, Killarney.
- Osmunda regalis**, Linn., var. nov. **decomposita**, Druery.
Osmunda regalis so rarely deviates from the type that the discovery of a new variety of this handsome fern possesses exceptional interest. Messrs. Boyd and Cowan, members of the Scottish Alpine Botanical Club, who spent a few days in Kerry last summer, had the good fortune to find what they considered an undescribed variety of *Osmunda* about two miles east of Blackwater Bridge. On submitting their gathering to Mr. Charles T. Druery, this opinion was confirmed, and the variety named and described by him. The var. *decomposita* occupies nearly the same position in relation to its type as var. *serratum* Willd. does to *Polypodium vulgare*. This fine variety should be found in other localities in the West of Ireland where the type is plentiful.
- Pillularia globulifera**, Linn.—2. Abundant, at intervals, nearly the whole length of the Long Range, Killarney.

I have to thank the Revs. E. S. Marshall and E. F. Linton for their kindness in looking over several doubtful plants.

Dublin.

THE WHITE WAGTAIL IN KILLALA BAY.

BY ROBERT WARREN.

ORNITHOLOGISTS may be interested in hearing that *Motacilla alba* has visited Bartragh Island again this season on its spring migration, being probably delayed on its northern journey by the prevalence of the northerly and north-easterly winds blowing so strongly during the end of April and beginning of May.

I heard from Captain Kirkwood, of Bartragh, that he observed several birds near the garden and wet flats (a favourite haunt) on the 8th, 9th, 10th, and 11th of May. On the last-named date he observed three birds, but all had disappeared on the 12th. This last occurrence, I think, may establish the fact of a regular line of migration every spring on the Island of Bartragh, for it is the *fifth* year's record of their regular visits since 1898, viz. :—

1898.

On the 29th of April the late Mr. A. C. Kirkwood met five birds in an oat-field, and obtained other specimens. On the 10th of May he observed a flock of fifteen birds, and shot a pair. This flock only remained part of the day, when they disappeared; but two or three days after were succeeded by a flock of five birds, some of which lingered on about the island until the 26th.

1899.

21st April.—One bird was seen about the stable-yard, only remaining the one day.

4th May.—Another was seen feeding about a manure heap, also in the yard.

1900.

23rd April.—One seen in the garden. Mr. A. C. Kirkwood, being very unwell, was unable to keep up his observations that spring, which accounts for only one being noted.

1901.

12th May.—Two seen in stable-yard.

20th May.—One seen feeding on lawn outside the parlour windows.

1902.

8th, 9th, 10th, 11th May.—Several birds seen.

As these birds were seen, in every instance, during the continuance of, or immediately after, northerly winds, it looks as if they visit Bartragh only to rest after fighting against adverse winds, and recruit their strength before continuing their long flight to Iceland.

Moy View, Ballina.

POLYZOA FROM BALLYCASTLE AND RATH, IN ISLAND.

BY LAURA R. THORNELLY.

I HAVE lately examined some material collected in 1896 by Mr. R. Welch in the above neighbourhoods and lent to me by Dr. Scharff.

Each of the two collections consists of about $1\frac{1}{2}$ ozs. of fragments of the appearance of coarse oatmeal. This is mainly composed of broken up colonies of calcareous Polyzoa. There are, besides, some few bits of flexible Polyzoa, some zoophytes, minute shells, and broken fragments of shells and stones.

The Polyzoa from the Ballycastle collection, taken from a depth of $24\frac{1}{2}$ fathoms, number 32 species, namely:—

Scrupocellaria scruposa, *Caberea Ellisii*, *Cellaria sinuosa*, *C. fistulosa*, *C. Johnsoni*, *Membranipora pilosa*, **M. Flemingii*, *Membraniporella nitida*, **Microporella ciliata*, *Schizoporella spinifera*, **S. auriculata*, **S. hyalina*, *S. unicornis*, *S. linearis*, **Umbonula verrucosa*, *Porella concinna*, **Smittia trispinosa*, **S. reticulata*, **Mucronella variotosa*, *M. Peachii*, *Cellepora Costazii*, **C. ramulosa*, *C. aricularis*, *C. pumicosa*, *C. dichotoma*,

Crisia cornuta, *C. denticulata*, *Idmonea serpens*, *Diastopora patina*, *D. obelia*, **Tubulipora lobulata*, *Lichenopora hispida*.

Those from Rathlin Island, taken from a depth of from 15 to 17 fathoms, number 33 species, namely :—

Gemellaria loricata, *Scrupocellaria scruposa*, **S. scrupea*, *Caberea Ellisii*, *Cellaria sinuosa*, *C. fistulosa*, *C. Johnsoni*, **Flustra foliacea*, *Membranipora pilosa*, **M. catenularia*, **Microporella Malusii*, *Schizoporella spinifera*, *S. linearis*, **S. simplex*, *S. unicornis*, **Hippothoa divaricata*, *Porella concinna*, **Mucronella ventricosa*, *M. coccinea*, *M. Peachii*, **Phylactella labrosa*, *Cellepora aricularis*, *C. pumicosa*, *C. dichotoma*, *C. costazii*, *Crisia denticulata*, **C. eburnea*, *C. cornuta*, *Idmonea serpens*, *Diastopora obelia*, *D. patina*, *Lichenopora hispida*, **Amathia lendigera*.

Those species marked with an asterisk are not common to both collections. Of some of these species, such as *Cellaria sinuosa*, *C. fistulosa*, and *Cellepora aricularis*, there are numerous fragments, many very likely belonging to one colony ; of others, such as *Membraniporella nitida*, *Phylactella labrosa*, &c., there are only a few small bits.

Sometimes these are adhering to broken shells, but oftenest they are chipped off these.

These fragments of colonies, with all trace of the living animals dissolved from them, are beautiful microscopic objects, the details of the cells being well preserved, showing their shining or opaque surfaces, their perforations and spines. Ovicells are present on several—on *Crisia*, *Scrupocellaria*, and *Membranipora*, &c.

The species have all been recorded as found off the northern shores of Ireland or as generally distributed, with the exception of *Cellaria Johnsoni*, which I have only seen recorded from Shetland.

The fragments of this form have no avicularia present, but the characteristic shape of the cells is plainly discernible.

Aigburth Hall Road, Liverpool.

INSECTS COLLECTED IN CO. SLIGO.

BY REV. W. F. JOHNSON, M.A., F.E.S.

[Collected for the Royal Irish Academy Flora and Fauna Committee,
July and August, 1901.]

MRS. JOHNSON and I spent from July 22nd to 29th at Sligo, and from July 30th to August 14th at Enniscrone. Unfortunately the weather was very broken, showers and cold winds prevailing, which seriously interfered with the success of our collecting.

The localities visited in the neighbourhood of Sligo were Rosses Point, Lough Gill, the south side of Sligo Bay as far as Cummeen House, and the river bank in Colonel Wood-Martin's demesne, which I was enabled to search by the kind permission of the owner.

Rosses Point is a high mass of rock on the northern side of Sligo Bay; beyond the point is a fine stretch of sand-hills, behind these the ground is flat, and there is a shallow lake with a little stream running from it into the sea. This formed our hunting ground. In the lake and stream were *Halipilus obliquus*, *Laccophilus interruptus*, *Cælamбус v.-lineatus*, *Laccobius bipunctatus* and *L. sinuatus*; on the flat ground, in dung, were various species of *Cercyon* and *Aphodius*, the best being *Cercyon analis*, *C. terminatus*, *Aphodius fætens*, and *A. nitidulus*, besides these there were *Ocypus cupreus*, *O. morio*, *Xantholinus glabratus*, and *Oxytelus laqueatus*; in sand at the mouth of the little stream we found *Dyschirius impunctipennis*, *Bembidium pallidipenne*, and *Bledius arenarius*; elsewhere, on the sand-hills and shore, were *Dyschirius globosus*, *Aleochara algarum*, *Philonthus varians*, and *Saprinus nitidulus*. Lepidoptera were almost absent, which was not to be wondered at seeing most of our collecting was done under the protection of waterproofs and umbrellas. I saw one battered *Satyrus semele*, a few *Pieris rapæ* and *P. napi*, and that was all. Of Hemiptera I took in the lake *Gerris odontogaster* and *Corixa atomaria*.

At Lough Gill we examined a portion of the shore and some meadows adjoining. The locality is very promising, and in fine weather no doubt plenty of insects would be about; but as it was with us a case of a net in one hand and an open umbrella in the other, the results were not such as we would have wished.

On the lake shore we took a couple of *Pelophila borealis* under stones, along with them were some *Anchomenus marginatus*, these were on damp mud; also *Anchomenus viduus*, *A. gracilis*, *Pterostichus nigrita*, *Cyclonotum orbiculare*, and *Philonthus quisquiliarius*; in a pond were *Cælambus v.-lineatus*, *Hydroporus palustris*, and the Hemipteron *Microvelia pygmaea*; beating hedges, trees, and reeds brought in *Stenus pallitarsis*, *S. similis*, *Halysia xvi.-guttata*, *H. conglobata*, *Dolopius marginatus*, *Adrastus limbatus*, *Galerucella sagittariae*, *G. tenella*, *Phyllotreta nemorum*, *Apion Gyllenhali*, *A. ervi*, *Nanophyes lythri*, *Grypoidius equiseti*, *Mecinus pyraeter*, and the Hemiptera *Nabis flavomarginatus*, *Plagiognathus arbustorum*, and *Idiocerus lituratus*. Of Lepidoptera there were none, nor did I see a single Neuropteran. The southern shore of Sligo Bay is very stony, and insects were not at all numerous; *Anchomenus dorsalis* and *A. albipes* were most plentiful (the latter was exceedingly abundant about Sligo), others that occurred were *Bembidium Mannerheimi*, *B. minimum*, *Ocytus morio*, *Xantholinus tricolor*, and *Stenus brunnipes*; in a piece of marshy ground *Tachinus taticollis*, *Aphthona nonstriata*, *Apion ervi*, *A. violaceum*, *Cæliodes iv.-maculatus*, and the Hemipteron *Acocephalus albifrons* were taken by sweeping. Our attempt at collecting in Colonel Wood-Martin's demesne was nearly spoiled by rain; however, we were determined not to give into the elements, so pushed on. At the edge of the river, among stones, &c., were *Carabus granulatus*, *Loricera pilicornis*, *Anchomenus albipes*, *A. parumpunctatus*, *Pterostichus madidus*, *Calathus cisteloides*, and such like. The only water-beetle that I could get was *Hydroporus pictus*. Beating and sweeping produced *Halysia xiv.-guttata*, *Dolopius marginatus*, *Helodes minuta*, *Microcara Bohemani*, *Cyphon variabilis*, *Telephorus thoracicus*, *Phyllodicta vitellinae*, *Hydrothassa marginella*, *Galerucella tenella*, *Aphthona lutescens*, and the Hemiptera *Calocoris sexguttatus*, *C. bipunctatus*, *Lygus contaminatus*, *Gerris costæ*, and *Evacanthus interruptus*. A few

Hydrocampa stagnata were the only representatives of the Lepidoptera, and *Mystacides azurea*, *M. longicornis*, and *Grammotaulius* sp. formed those of the Neuroptera.

We were most fortunate in being able to proceed from Sligo to Ballina by steamer, thus avoiding the long and roundabout journey by rail. The *Fern*, Captain Beatty, conveyed us in three hours to Ballina, a journey which by rail would have taken more than twice as long. The voyage was very pleasant, and had the day been less hazy we should have had a fine view of the Sligo coast and the Ox Mountains; we, however, enjoyed the scenery of the River Moy. Behind Bartragh Island we could see the ancient town of Killala, and a little further up the abbeys of Rosserk and Moyne claimed our attention; both sides of the river are finely wooded, and near Ballina we passed the beautiful demesne of Belleek.

From Ballina we travelled to Enniscrone by motor car! a startling development for the West.

Enniscrone is a little fishing village and seaside resort on the Sligo side of Killala Bay, and is a delightful spot for an entomologist. Between the village and the mouth of the Moy the coast is sandy, and the coast sand-hills are of great height; behind them lies a tract of low ground, the part next to the sand-hills being covered with dwarf sallow, the rest being grass, and becoming marshy as it approaches the bank of the Devlin river, a little stream which flows into the Moy. From the junction of the two streams down to the sea runs a sandy ridge covered with Bent and Ragweed. The shore in front of this ridge we found to be one of the best hunting-grounds about. Near the mouth of the Moy was an immense bed of *Cakile maritima*, and outside on the seaward side of the sand-hills was another large bed of the same plant. These proved a strong attraction to insects.

On the sandhills, on the one or two fine days that we had, we found sand wasps plentiful, but only took two species, viz., *Mellinus arvensis* and *Pompilus niger*. The first was very abundant and in places the sand was honeycombed with their burrows. I noticed that these insects kept entirely to the part of the sandhills next to the sea. On the Bent were numbers of *Psylliodes marcida* and *Micrambe vini*, and on Ragweed we took *Longitarsus luridus*, *L. jacobææ*, *Apion loti*, and

A. hydrolapathi. At the *Cakile maritima* were various Lepidoptera, *Vanessa io*, *V. cardui*, *Macroglossa stellatarum*, *Agrotis velligera*, *A. tritici*, *A. nigricans*, and *Leucania littoralis*. I daresay we would have got many other moths but for the bad weather. We had only one night at the flowers that produced anything; other evenings were too cold for the moths to be about. Besides these Lepidoptera, I took a few bees, *Bombus venustus* and *B. terrestris*, at the flowers, and crawling on the sand under the plants the coleopteron *Saprinus maritimus*.

Though there were several dead rabbits lying about, I found very few carrion beetles, the only species being *Necrophorus ruspator* and *Silpha rugosa*. Immediately behind the sandhills the ground is cut up in a most peculiar manner into small raised mounds of irregular shape which we likened to garden beds—these mounds were of sand grown over with dwarf Sallow, Ragweed, Scabious, and Moss. In the bare sand between these mounds were *Blodius erraticus*, *B. longulus*, *Dyschirius politus*, *D. globosus*, but none in plenty; they were scattered about in little colonies and took a great deal of work to get. Among the herbage were *Myrmedonia collaris* (a single specimen captured by Mrs. Johnson), *Osrobitis cyaneus* (also a single specimen), *Anisotoma calcarata*, *Phyllodecta vitellinæ* (on the sallow), *Adimonia tanacetii*. On the Ragweed and Sallow we obtained the larvæ of *Lasiocampa rubi*, and flying at dusk were plenty of *Cidaria testata*, also *Eubolia mensuraria* and a very bad specimen of *Eupethecia absynthiata*. In the grassy ground beyond these mounds we took *Epinephele janira*, the female approaching the male form very nearly; but sweeping the herbage proved to be a waste of time. Near the little river mentioned above were some small pools and in these I took *Octhebius bicolon* and *O. punctatus*. Several species of *Aphodius* occurred in *stercore ovino* among the sandhills and on adjacent ground, the best being *A. nitidulus*, *A. scybalarius*, and *A. putridus*. The second of these was the most abundant; *Geotrupes* was not plentiful, and I only met with *G. spiniger* and *G. stercorarius*. Along the river bank, or rather the shore of the estuary, the swirl of the current had deposited a good deal of seaweed, and under and in this were numbers of *Cercyon littoralis*, var. *bipunctata*. This form was very plentiful

and the markings were very constant—the type also occurred and *C. depressus*. Turning over these lumps of weed I came on single individuals of *Bledius spectabilis*, but for some time could not locate any number. One day, however, at a spot higher up on the beach, where Sea-pink was growing and a little grass, I had been vainly digging for the species when Mrs. Johnson pointed to a part that was slightly raised, and said “I am sure they are there.” I accordingly delved deep into the sand and brought up three *spectabilis* !

We then set to work and tilled that piece of ground with great diligence, and were rewarded with quite a nice lot of the *Bledius*. Along the same part we found *Bembidium minimum* in numbers, running on the sand, and among dried seaweed, &c., a few *Bledius fuscipes* were also obtained, as well as *B. arenarius* and a good number of *Dyschirius impunctipennis*. Turning over seaweed I came on *Heterocerus flexuosus*, and obtained a couple of very dark specimens in one of the little ponds mentioned before, and a few were dug up when searching for *Bledius*. They were not however at all plentiful. Other captures on the sea-shore were *Dichirotrichus pubescens*, *Aleochara nitida*, *A. obscurella*, *Creophilus maxillosus*, *Cafius xantholoma*, *Omalium riparium*, the large white form of *Philopodon geminatus*, and the Hemiptera *Salda saltatoria* and *Lygus pabulinus*. I brought home two larvæ of *L. rubi* and Mrs. Johnson took charge of them—they have successfully hybernated and are still alive, in spite of the severe frosts of the winter.

I was greatly pleased with Enniscrone, and only regretted that my stay there was so short and that the weather was so unpropitious—the latter circumstance hindered me from making any extended excursions—I had intended going to Lough Conn, but was quite unable to get a suitable day for the excursion.

Poyntzpass.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Parrot from Mr. H. H. Gamble, three Squirrels from Mr. W. W. Despard, an Alligator from Mr. J. E. Wellwood, a Chacma Baboon and a White Monkey from Capt. Reeves.

BELFAST NATURALISTS' FIELD CLUB.

JUNE 7.—EXCURSION TO STORMONT GLENS.—A party of over forty members and friends went to Belmont by tram, and, under the guidance of Miss Walkington, LL.D., who acted as conductor for the day, the ascent of the West Glen was commenced. The botanists of the party here began their field work; wild flowers and ferns were in profusion. The zoologists explored the river for various forms of animal life, dredging in the water, turning over stones, or "sweeping" the vegetation on the banks with nets and scoops. The party emerged into a lane, which brought them to the old fort or rath. Here tea was ready, and was found very refreshing. After resting here the fort was examined, and the usual business meeting held. Mr. Wm. Swanston, F.G.S., was moved to the chair, and he called upon Mr. W. H. Patterson, M.R.I.A., who gave an account of the fort and the probable manner of life of its former inhabitants. With the exception of the Giant's Ring, it is the largest fort in the district. Several questions having been answered, three new members were elected, and a vote of thanks to Miss Walkington brought the formal meeting to a close.

MAY 24.—EXCURSION TO GLENARM.—Arriving at Larne, the party proceeded to Waterloo. A short stop was made here to inspect the fine exposure of Lower Lias on the shore. A few of the fossils characteristic of the various zones of this formation were found *in situ*. Proceeding through the tunnel, the next stop was made at Ballygally Head. One section of the party ascended the headland, while the other went round by the shore; both parties meeting at the old castle. Leaving the shore at Ballygally Castle, the old church above Wheyburn was visited, Mr. F. J. Bigger pointing out and describing some fine heraldic tombstones. Many specimens of our common flowers and ferns were observed, but as the Botanical Section was scarcely represented among the party, good things were passed unrecorded. Proceeding by the old road, past Sallagh Braes and Scawt Hill, the members were enabled to obtain excellent views of the scenery and the general geology of the district. A stop was made above Ballyruther; some members took the opportunity to inspect the gravels near the shore, but their cursory examination yielded only a few derived fossils. The shore road was

again reached near Drumnareagh Port. Beyond this the road showed the effects of recent landslips, large masses of freshly slipped Chalk and Lias being noticeable on each side of the road. At Glenarm the various places in the neighbourhood of the town were visited.

DUBLIN MICROSCOPICAL CLUB.

APRIL, 9.—The Club met at Leinster House.

MR. M'ARDLE exhibited *Cephalozia pallida* Spruce, which was collected by himself and the Rev. Canon Lett at Pontoon, on the shores of Lough Conn, Co. Mayo, in May last year. The specimen of this minute liverwort was in fruit; the perianth is very fragile, composed of a single layer of cells; the capsule oval, dark-brown, with pale-yellow spores and bispiral elaters. The plant was found many years ago by the late Dr. D. Moore on the shore of Lachan Bay, in the same county; It has also been collected on the Hill of Howth, Lough Bray, Co. Wicklow, on Mount Brandon and other stations in the Dingle peninsula, by Mr. M'Ardele.

DR. PETHYBRIDGE exhibited slides and pure cultures in plum-gelatin of a fungus found growing in the leaf-sheaths of *Dactylis glomerata*. The organism first attracted attention on account of its pink colour; this is due to a pigment contained in solution in the cells of the septate mycelium, and in the cultures it appeared to be formed only in the hyphæ living in the substratum, the aerial hyphæ being white. No satisfactory solvent for the pink colouring matter had been found, nor had the fungus produced spores or conidia of any kind, so that it was not possible to identify it.

MAY 14.—The Club met at Leinster House.

MR. MOORE showed hooks from fruits of a species of *Loasa*, probably *L. lateritia*. The outer surface of these fruits is covered with fine hairs, shaped like a mushroom anchor, along the margins of which are many strong hooks or teeth, pointing downwards. The stalks of these hairs are beaded, and each segment has a hook pointing downwards. These hooks catch firmly any object they come in contact with, causing the fruits to be carried about by animals, and so enabling the seeds to be spread about.

MR. M'ARDLE exhibited portion of the frond of *Metzgeria hamata*, Cnidberg, the largest of the genus which is found in this country, and easily separated from all others by the long marginal hairs which are divaricate, hooked, deflexed. The female fruit has not been found on Irish specimens. Those exhibited bore antheridia, and were also interesting as showing how the plant reproduces itself by the process of budding. They were collected at Torc Waterfall, Killarney, in 1877; the plant is frequent in the mountainous parts of the Dingle peninsula, Co. Kerry, and in similar situations in the Co. Mayo. It has recently been collected in Ben Vorlich ravine, in the district of Lough Lomond, Scotland, by Mr. Macivar, and is well known in the tropics and sub-tropics.

CURRENT LITERATURE.

Belfast Naturalists' Field Club.

We have received, after a hiatus of three years, an issue of the *Proceedings* of this Club. The present part is for the years 1899-1900 and 1900-1901, leaving the publication still a year in arrear. Concise reports of the papers read, and excursions held during these two years are given, and the issue is embellished with portraits of the Presidents of the Club during the period 1888-1902. Both the editing and proof-reading unfortunately leave much to be desired, and are unworthy of the traditions of the Belfast Club. At the end of the part is an Index (but no title-page!) to vol. IV. (series 2), 1893-4 to 1900-1. This is as slovenly in its execution as the rest of the work.

Moss Exchange Club.

We have received the seventh Annual Report of this Club, which contains as usual notes on several Irish plants.

NOTES.

BOTANY.

Plants of Co. Kildare.

Carex sylvatica and *Phleum pratense*, desiderata for Co. Kildare, were noted at Longtown, near Clane, last autumn. *Scrophularia umbrosa* Dum., was also noted by the Liffey side, about two miles above Clane, an extension to the range of this apparently local plant. Its only other Kildare station lies on the Liffey, close to Co. Dublin border.

R. W. SCULLY.

Dublin.

Potamogeton plantagineus in Co. Wicklow.

I have an undoubted specimen of this pondweed gathered by me some years ago in a ditch on the Murrough of Wicklow, near Newcastle. David Moore's record for this county may therefore stand; it is rejected in *Top. Bot.*, p. 319.

R. W. SCULLY.

Dublin.

The Poisonous Effects of the Irish Spurge.

In the *Proceedings* of the Royal Society, No. 360, May, 1902, will be found an interesting paper by Dr. H. M. Kyle, detailing the results of experiments to determine the nature of the fish-poisoning qualities of *Euphorbia hiberna*. Dr. Kyle's conclusion is that these effects are due to the tannic acid contained in the plant, which produces inflammation of the gills and consequent stasis of the circulation.

A Botanical Coronation Fête.

One of the methods by which the coronation of the late Queen was celebrated was a *fête champêtre* and flower show in the Belfast Botanic Gardens on Thursday, June 28th, 1838. A most attractive feature of this show was an exhibition of the wild flowers of the country, and the award of prizes for collections of native plants. An account of this *fête* appeared in the *Northern Whig* of 30th June, 1838, and is of much interest to the present race of Irish botanists. The writer says—"The novelty of the 'Templeton Prizes' for native plants rendered this portion of the exhibition perhaps the most interesting. We confess, it exceeded the utmost of our expectations; and we venture to say, that very few who were present, had formed the least idea of the various and beautiful wild flowers with which our mountains and valleys are adorned The first Templeton Prize was awarded to Mr. Moore, Assistant in the Geological Department of the Irish Ordnance Survey, for the following plants, the names of which we took from the different labels:—*Habenaria alba*, and *chlorantha*; *Listera nidus-avis*, and *cordata*; *Carex curta*; *Orobancha rubra*; *Pyrola secunda*, *media* and *minor*; *Drosera anglica*, *longifolia*, and *rotundifolia*; *Vaccinium oxycoccus*, and *vitis-idea*; *Scutellaria galericulata*; *Arenaria verna*; *Sedum dasyphyllum*; *Hymenophyllum Wilsoni*; *Grammitis ceterach*; *Cyathea fragilis*; *Cryptogramma crispa*; *Osmunda regalis*; *Ophiod glossum vulgatum*; *Botrychium lunaria*; *Isoetes lacustris*; *Splachnum ampullaceum*, and *sphaericum* variety *tenue*; *Bryum nutans*. Two additional medals were awarded for single indigenous plants—one to Miss Richards, of Bangor Castle, for *Ophrys apifera*; the other to J. A. Whitla, Esq., of Gobrana, for *Epipactis grandiflora*. Amongst the varied collection, we observed a very singular variety of *Primula vulgaris*, discovered by Miss Conyngham, at Lisdhu, Co. Tyrone, the petals of the flowers being perfectly green."

S. A. STEWART.

Belfast.

ZOOLOGY.

Lepidoptera in Co. Mayo.

While botanizing for mosses and hepatics during the first week of May, 1901, in the neighbourhood of Pontoon, on Lough Cullin, Co. Mayo, I observed several Peacock Butterflies (*Vanessa io*); and one day when the sunshine was warm, along the wild ground between the bridge and the hotel, Green Hair-streaks (*Callophrys rubi*) were abundant. I also saw in three different spots on the margin of the natural woods that still remain some Tortoise-shells, which appeared to be larger and of a duller colour than the common Tortoise-shell (*Vanessa urticae*). Mr. D. M'Ardle, of Glasnevin, who was in my company, also had a good view of all these insects when they alighted on the low bushes within a few feet of where we happened to be. We had no way of taking any specimens, but were able to get so near as to have individuals of all three species frequently almost close enough to touch and under observation for some minutes at a time.

H. W. LATT.

Aghaderg, Co. Down.

Lycæna argiolus in Co. Waterford.

The Holly Blue is very abundant about here. I have noticed it as early as the 26th of March (*Ir. Nat.*, 1894, p. 114). This, I think, is the earliest record as far as Ireland is concerned. This year, on March 28, I saw two or three males, and heard the Chiff-chaff for the first time on the same day. The males of the Holly Blue about here usually precede the females in emergence from the pupa state. On April 10 this year I caught seven—all males; on 11th, fifteen—all males; and on the 15th, forty-four, of which all were males, except two. I liberated a number of this last capture. The butterflies were so abundant on the 15th that sometimes I could have netted three together. At one place I was much interested in watching two of them standing on a small wet spot sucking up the moisture from the black moist ground. It recalled many pleasant days of collecting in Switzerland, when a wet spot on a mountain's side has often caused one's heart to pit-a-pat with excitement at the sight of hundreds of butterflies crowded together, generally on a very small spot, having their morning drink or afternoon tea. I have never seen *L. argiolus* here in the autumn, although constantly on the look-out for it.

W. W. FLEMING.

Coolfin, Portlaw, Co. Waterford.

Early appearance of *Vanessa io*.

Last month I recorded a very late capture of this butterfly by Rev. C. L. Garnett, M.A., at Tynan, Co. Armagh; I have now to record the capture by the same gentleman of the same butterfly on April 26th, at Ardrea Rectory, Co. Tyrone. Considering the season and the position of Ardrea this capture is remarkably early.

Mr. Garnett notes the appearance of *Parage egeria* on April 25th, and *Euchloe cardamines* and *Pieris napi* on April 28th.

W. F. JOHNSON.

Poyntzpass.

Monohammus confusor at Belfast.

A specimen of this fine North American Longicorn was sent to me by Mr. W. H. Patterson, M.R.I.A. It was captured in a garden in the vicinity of Belfast. A quantity of wood that had come as ship's dunnage from Texas was carried to the garden in question, and the gardener, who was cutting up the wood, noticed three cocoons, or "cops" as he called them, and threw them away; soon after the beetle was captured near the same spot.

W. F. JOHNSON.

Poyntzpass.

Vertigo edentula on Furze bushes.

I discovered a strange habitat for this species a few days ago. As I was beating some Whin bushes to dislodge weevils I had folded my handkerchief round a forked twig to form a beating tray (this presented a surface less than 7" + 7"). The weevils were plentiful, but I was surprised to find several small shells knocked down with them. I continued my operations for fully ten yards along the fence and the rain of shells continued all this distance.

Considering the size of my tray the colony must have been a fairly large one. I secured sixteen shells, but many more were blown away before I could secure them.

I had not previously found this species except on the surface of the ground, and then generally under moss or leaves, while in this case they were between two and three feet from it.

HUGH L. ORR.

Belfast.

Some new stations for Mollusca.

During some visits to the west and north-west coasts, Mr. W. J. D. Walker collected a quantity of shell debris, &c., for me at high water mark. After sieving out the coarser shells and the fine sand and *Foraminifera*, a mass of small shells was left; most of these were common or moderately common, but a few were rare and local. That from the strand on Sheep Haven, at Rosapenna Hotel, was very small in quantity, but it gave twenty species and two varieties. These included *Odostomia plicata*, *Eulimella* (*Odostomia*) *nitidissima*, a new record for the north-west coast, and the curious little *Otina otis*, which lives between tide marks. It is a very local species and has been recorded from only two stations on the west coast since Prof. Harvey first found it at Miltown-Malbay, County Clare, over half a century ago.

The material from Mallaranny strand, Clew Bay, was largely composed of two common small species, *Rissoa parva* and *Hydrobia ulva*; but with these were 25 other marine shells, including *Rissoa cancellata* and *Tornatina obtusa*. The brackish water species *Hydrobia ventrosa* was also present, a new record¹ for the west coast; it is known on the east coast at Larne and Dublin only.

Some surface scrapings from Youghal strand yielded 13 species, including *Sphenia binghami*, the third record only, I think, for the south coast. I have to thank Dr. Chaster for looking over the smaller species. The *Foraminifera* floated from the finer sievings are in Mr. J. Wright's hands for examination.

R. WELCH.

Belfast.

Longford Land and Freshwater Mollusca.

Mrs. J. Mackay Wilson, Currygrane, Co. Longford, has kindly forwarded me the following 24 species, mainly from the shores of the lough there, but including the Swan-mussel from Glen Lough, and some slugs collected by her gardener, Mr. M. Smith, also at Currygrane.

As no shells whatever are recorded for this county in the last Census of the Conchological Society, these are all new county records, so far as that Census is concerned. Dr. Scharff, however, recorded all for District VII. (4 counties) in his Irish List, 1892, except *Planorbis crista* and *Pisidium milium*, which are additions to it.

Vitrina pellucida, *Hyalinia cellaria*, *Arion subfuscus*, *A. hortensis*, *Agriolimax agrestis*, *Helix pulchella*, *Cochlicopa lubrica*, *Succinea elegans*, *Limnæa stagnalis*, *L. peregra* and var. *lacustris*, *L. palustris*, *Planorbis marginatus*, *P. contortus*, *P. albus*, *P. crista*, *P. fontanus*, *Ancylus lacustris*, *Bythinia tentaculata*, *Valvata piscinalis*, *V. cristata*, *Sphærium corneum*, *Pisidium fontinale*, *P. milium*, *Anodonta cygnea*.

R. WELCH.

Belfast.

¹ See p. 140 supra.—Eds

Gadwall in Co. Clare.

On the 4th March last I obtained a fine specimen of a male Gadwall (*Anas strepera*, Linn.) from my friend Rev. S. W. King. The bird was shot at Kilkishen, Co. Clare, and the occurrence is interesting inasmuch as this species has not been recorded (as far as I know) as obtained from this county before. Ussher, in his recent work on the "Birds of Ireland," p. 193, states that "the Gadwall has been obtained in the following counties:—Kerry, Cork, Waterford, Tipperary, Wexford, Dublin, Queen's Co., King's Co., Westmeath, Louth, Mayo, Sligo, Fermanagh, Down, Antrim, Londonderry, and Donegal."

The Gadwall is an irregular winter visitor, and not at all common in Ireland. I hope to publish more particulars about my specimen later on.

CHARLES J. PATTEN.

University College, Sheffield.

Spring Migrants.

We have received several notes regarding the first appearance of our migratory birds. At Cushendun, Co. Antrim, Rev. S. A. Brennan noticed Swallows on April 2nd, and Chiffchaffs on April 6th. At Poyntzpass Rev. W. F. Johnson noticed Chiffchaffs on March 28th, the first Swallow on April 9th, and the Willow Wren on April 11th. From Newtown-butler Rev. J. G. Parkinson-Currie reported Cuckoos and Corncrakes abundant on April 24th.

Lesser Horse-shoe Bat in Co. Clare.

Mr. Ussher and myself visited several caves on the 23rd April last, in Co. Clare, with a view to recommending their ultimate exploration to the Cave Committee. When creeping into the inner recesses of one of these caves belonging to Mr. M'Donnell's property, I was surprised to find several rows of small black objects suspended from the roof of the cavern. On holding the lamp closer to them, they began to move, and thus revealed their real nature. They were specimens of Lesser Horse-shoe Bat (*Rhinolophus hipposideros*), about 20 of which had here found a comfortable retreat.

I brought back a few alive, which I sent to Dr. Alcock, from which we shall, I hope, get some interesting details as to its food and habits. This species of bat seems to be common in Western Ireland, though, apparently unknown in the East. The first specimens found were discovered in Ballyallia Cave, not far from the locality here referred to; and subsequently Mr. Foot met with it in three caves at Edenvale, near Ennis, one of which may possibly be the same cave as the one above described. It has since been taken in other parts of Clare, at Killarney, and also near Galway.

R. F. SCHARFF.

Science and Art Museum, Dublin.

Breeding of small Mammals.

In the last week in May an unusually large Brown Rat (*Mus decumanus*) was killed in a garden near my house. On opening it sixteen well-developed young were taken out. This number seemed to me so extraordinary that I consulted all the authorities I could on the subject. Bell ("British Quadrupeds," 2nd Edition, 1874, p. 314) says they produce 10, 12, or 14 at a birth. Lydekker ("British Mammalia," 1895, p. 197) says it commonly produces "from 8 to 10 young ones at a birth, while the number sometimes rises to a dozen, or even more." Oldfield Thomas, in the "Encyclopædia Britannica," gives 10 as the highest number. I would be glad to know if others have observed such a large number as *sixteen* young from one female.

How many young does the Lesser Shrew (*Sorex minutus*) produce? One taken near this last month contained eight young. There are still many points to be settled in the life-histories of our commonest mammals, and questions such as the above open up fields for original investigation which would well repay time and trouble.

ROBERT PATTERSON.

Belfast.

GEOLOGY.

Notes on Blown Sand at Whitepark.

On the occasion of the Easter visit of some members of the B.N.F.C. to Whitepark Bay, Co. Antrim, we noticed a very curious and beautiful process going on among some of the gullies in the dunes. Across the miniature canons, formed by a rivulet, a breeze was blowing, which deposited fine dry sand near the top of the declivity. This dry sand trickled down the hill, sometimes as oil might have done, in little flat streams, sometimes like drops of water on a window-pane during a shower. The amount of sand thus deposited was very considerable, and there was a perceptible growth in the "talus" of sand at the foot of each slope in the course of an hour. The talus formations were very pretty, perfect minatures of mountain scenery being formed. Among the other details noticed was the rapid filling up of the wind-ripples and raindrop marks formed on the same morning, showing how many similar markings may well have been preserved in our ancient sandstones. Whenever a streamlet of sand came to one of the little cliffs, it fell over in what was described by a member as a "dry waterfall," blown up like spray by an eddy in the wind, or falling steadily like a tiny Niagara. The little sand canons of Whitepark are already well known for their analogy to the giant examples of their kind at Colorado.

ALEC WILSON,

Newtownbreda, Co. Down.

A NEW ERICA HYBRID.

BY REV. E. F. LINTON, M.A.

A FEW years ago the late Dr. Charles Stuart discovered a heath in Connemara, which appeared to him and Dr. M'Farlane (then of Edinburgh), to whom specimens were submitted, to be a new sub-species, or possibly a hybrid. They were inclined to connect it with *E. Tetralix*, L.

When specimens reached me two years ago, through Mr. W. B. Boyd, of Faldonside, Melrose, I noticed at once that the exertion of the anthers was like that of *E. mediterranea*, L. (*E. hibernica* Syme), a feature which distinguishes it from all other Irish species. Following up this clue, I saw that the narrow tube of the corolla, and the pale colour of the lower part of it, were also borrowed from this source; and the combined evidence was strong enough to overcome the natural objection that the flowering season of *E. mediterranea* does not coincide with that of other Irish species. It happens that the one plant of the Irish form of this heath in my garden continued one year to flower into the summer, or else bloomed a second time; and in the moist climate of Connemara this is, perhaps, more likely to occur; and so the objection is entirely removed.

The young twigs of *E. Stuarti*, as Dr. Stuart's heath has been called, are clothed with plenty of rather long hairs, like *E. Mackaii*, Hooker, whereas the twigs of *E. Tetralix* are densely tomentose and not hairy; the leaves, also, though varying much in breadth, are almost identical with those of *E. Mackaii*, both in shape and clothing, and differ consequently from those of *E. Tetralix*, which are narrower, and mealy all over the under surface. I am convinced, therefore, that this form is a hybrid between *E. mediterranea* and *E. Mackaii*. The following description is taken from a short account of the plant by me in the *Annals of Scottish Natural History* (1902, pp. 176-7):—

Erica Stuarti, nov. hybr.—“Leaves in whorls of four, or irregularly scattered, ovate-oblong or lanceolate, ciliate

glabrous above, puberulous (mealy) beneath except on the midrib, margins revolute; young twigs hairy; sepals ovate-acuminate ciliate, puberulous towards the tip; corolla cylindric-urceolate, nearly white below, shading upwards to deep rose-purple; stamens and styles somewhat exserted; ovary nearly glabrous, with a few hairs upwards."

If, as I believe, I am right in this determination, it is obvious that the geographical area in which *E. Stuarti* can occur is a very restricted one.

Bournemouth.

SOME CRETACEOUS FORAMINIFERA FROM NORTH ANTRIM.

BY R. WELCH.

WITH LISTS AND NOTES BY JOSEPH WRIGHT, F.G.S.

DURING an Easter holiday spent at Ballycastle this year with some fellow members of the Belfast Naturalists' Field Club, I noticed in crevices of a chalk cliff in the little glen at Kenbane Head fairly large quantities of chalk powder. This was evidently the result of rain washing the weatherings of the cliff face into the hollows, and I thought might yield Foraminifera, as the weathered chalk in hollow flints does. So far the results have been very poor, the Foraminifera seem to have been too much dissolved in the process of disintegration; but I was more fortunate in results from a small piece of chalk noticed in a mass of earthy peat in a zone of the sand-dunes at Whitepark, below the "Kitchen-middens" there. This I found to be quite soft, so promptly boxed it, and on washing it through a very fine sieve at home found the greater portion, as fine as flour, disappearing in the washings and leaving a residue of a few grains only. This seemed to be much finer than that usually washed from hollow flint material, and was quite free from the flint fragments, &c., usually associated with

latter. The carbonic acid from the peaty deposit had evidently quite disintegrated the chalk without destroying all the constituents.

Mr. J. Wright, F.G.S., kindly examined this small residue and lists the following thirty-three species and two varieties:—

CHALK FORAMINIFERA, WHITEPARK BAY.

Textularia turris, d'Orb. One specimen.

T. globulosa, Ehr. Very common.

Spiroplecta prælonga, Rss. One specimen.

Verneullina triquetra (Münster). Rare.

Bullmina elegans, d'Orb. Rare.

B. ovulum, Rss. Rare.

Bolovina obsoleta (Eley). Rare.

B. decorata, Jones. Rare.

B. serrata (Chapman). Common.

B. textularioides, Rss. Rare.

Lagena globosa (Montag.). Rare.

L. gracillima, Seg. Very rare.

L. sulcata (W. and J.). Rare.

L. lagenoides (Will.). One specimen.

var. **tenuistriata**, Br. Quadrigonal form (= *L. quadrata*, Br. Chall. Reps., t. lxi, f. 3), very rare. Trigonal form, very rare. The quadrigonal form has only been hitherto found in two of the *Challenger* gatherings, and has not been found since either recent or fossil.

Nodosaria radícula (Linn.) One specimen.

N. communis, d'Orb. Rare.

N. farclmen (Sold.) Rare.

N. pauperata, d'Orb. One specimen.

N. raphanus (Linn.) One specimen.

N. scalaris (Batsch). One specimen.

Lingulina carinata, d'Orb. Very rare.

Vaginulina legumen (Linn.) Very rare.

Marginulina glabra, d'Orb. Very rare.

Cristellaria rotulata (Lamk.). Rare.

C. italica (Defr.). Young; one specimen.

C. crepidula (F. and M.). One specimen.

Polymorphina lanceolata, Rss. Rare.

Uvigerina, Sp. Frequent.

Globigerina cretacea, d'Orb. Very common.

G. æquilateralis, Br. Very common.

Planorbullina exculpta, Rss. Frequent.

P. ammonoides, Rss. Frequent.

Pulvinulina michelliana, d'Orb. Frequent.

The material from which the above were obtained weighed only 'or oz. troy. It was the first weathered white limestone which we had seen. The Foraminifera in it were calcareous and in this respect differed from those found in the flints, the tests of which alone are calcareous, the interior of the shells being silicious. The materials consisted almost exclusively of small Foraminifera and minute spherical bodies, being the separate chambers of these Microzoa; they were probably to a great extent derived from *Globigerina cretacea*, *G. æquilateralis*, and *Textularia globulosa*; it frequently happened that the chamber of these species became detached as the specimens were being lifted for mounting. The following are some of the rare forms found—*Bolivina serrata*, *B. obsoleta*, *Lingulina carinata*, *Lagena gracillima*, *L. lagenoides*, and the variety *tenuistriata*, both trigonal and quadrigonal forms.

Mr. H. L. Orr collected a little powder from hollow flints at Ballycastle Harbour quarries. This locality I know of old to be a very good one for large *Nodosaria* (sp.?), and I hope to obtain a larger mass of material to wash soon. In the sample Mr. Wright finds *Flabellina pulchra*, d'Orb.; *F. reticulata*, Rss.; *Textularia turris*, d'Orb.; *T. globulosa*, Ehr.; *Bulimina Presli*, Rss.; *B. brevis*, d'Orb.; *Cristellaria rotulata*, Lamk. *C.* sp.?; *Globigerina cretacea*, d'Orb.; *Orbulina universa*, d'Orb.; *Planorbulina exculpta*, Rss.; *P. ammonoides*, Rss.

The last species was common, the others rare or represented by only one specimen, but the quantity of powder was very small. The few specimens in it Mr. Wright states were mostly large in size.

Belfast.

SOME PLANTS SEEN ALONG A COUNTY DOWN RAILWAY.

BY J. H. DAVIES.

In the course of recent months I have had occasion frequently to journey over part of the branch line of railway from Scarva to Ballyroney, and sometimes to wait for the train at Lenaderg, which, as a goods-siding on that line for the accommodation of adjoining bleaching fields, is of some importance. Though used by passengers, yet for some reason known only to the official mind, it is not recognised as a passenger station, and the name does not appear in the time-table.

In April and May one could not stand on the exposed, gravelled platform there without noticing the profusion of *Sisymbrium Thalianum* and *Erophila vulgaris*, neither of these crucifers, as is known, being by any means frequent in the North-east. They were found to occur along the line for a considerable distance, also at the borders of neighbouring lanes, and probably extend much beyond the parts examined. They appeared again at Scarva, some miles southward, both at the County Down border, and in the conterminous County of Armagh. In the slight effort made to ascertain their range at Lenaderg, *Cystopteris fragilis* was met with in crevices of a shady wall, a "low-ground" locality; the fern being a very small and unusual form, from base of stipe to apex of frond not exceeding three inches, and differing in other respects from the typical plant. The form is unknown to my pteridological friend, Mr. W. H. Phillips, of Holywood, for whom, not without qualms of conscience, for there is not much of it, I rooted up two or three plants for cultivation in his fernery. These he will keep under notice, and afterwards favour me with some observations thereon.

At Scarva *Ceterach officinarum* was seen on a high wall of a bridge across the stream dividing the two counties. There also, were gathered two rare mosses, *Barbula lurida* and *Orthotrichum stramineum*, the former new to the northern flora. A note of these, and of some other new and scarce Irish mosses, recently observed in the North-east, may be given at another time.

Close by Lenaderg, under trees by the banks of the Bann, which there flows along the side of the railway, are masses of *Equisetum hyemale*, which, with I think one exception, is known elsewhere in County Down only in the Mourne Mountains. Another plant that I had the good hap to gather at the same spot was *Amblystegium fluviatile*. The moss was found on rocks in the river shallows, where there is a rapid current. At the time I was not aware that it had ever been found in the North before, but Canon Lett has since informed me that he met with it in July, 1900, at Corbet, some miles higher up the Bann. It has been reported, I believe, from only one other Irish station, and that in the extreme south.

One of the most interesting plants observed at the Lenaderg siding, interesting not only on account of its beauty, but by reason of its rarity, and one least expected in such a place, was *Spergularia rubra*. A few plants were first seen on the siding platform, and, rendered conspicuous at the end of June by its rosy inflorescence, it was easily traced, in goodly quantity, for a distance of nearly a mile along the line of railway, and is also plentiful by the railway side at Banbridge.

On an old wall at Knocknagor, near the Bann, and not far from the Lawrencetown station, is very characteristic and most abundant *Poa compressa*.¹ That it is as native there as any other Irish grass nobody, I think, seeing it growing, could entertain the slightest doubt. The wall on which it was seen is one that, I am happy to think, is never likely to be besmeared with the objectionable cement beloved of unæsthetic, if well-meaning, county councillors.

One day in June from the train, as it slowly glided through a deep, rocky cutting between Banbridge and Mullafernaghan, my attention was caught by a stately, golden-flowered Hieracium-like plant. As seen from the train it seemed so unusual, and so much excited my curiosity that I took the first opportunity of walking along the line to examine it. The plant was then found to be *Crepis biennis*. It grows there in

¹ Mr. S. A. Stewart, to whom I sent specimens of *Poa compressa*, writes :— "Native, as you say, without doubt. I can't see why anyone should question it. I would as soon suspect *Bellis perennis*. It is easy to see how it has so long escaped observation in these unscrutinised spots. That is the only escape about it."

amazing numbers and so luxuriantly, on the rough, steep bank, which is never cultivated, and seemingly never disturbed, that one may conjecture it to be of long standing there. It is not to be seen in any of the adjacent fields. It is a trite saying that the casual of to-day often becomes a more or less familiar object in the future, and that appears to be so in the case of the present plant. First discovered in Ireland by Mr. Stewart, near Belfast, upwards of twenty years ago, it was excluded by him from *Flora of North-east Ireland* as a poor alien. It seems now to have established a permanent home here, and to have gained the right to colonial citizenship.

Other things of interest might, no doubt, have been noticed had one been in these places to botanise, but I was only a passing wayfarer.

Lisburn.

NOTES.

BOTANY.

Characeæ of County Monaghan.

I ought to have stated in my paper, which appeared in the last issue of the *Irish Naturalist*, that specimens of the plants collected were submitted to Messrs. H. and J. Groves, who were good enough to give me their valuable aid in their identification and verification.

G. R. BULLOCK-WEBSTER

Ely.

Carex paludosa Good. var. *spadicea* Both in Ireland

Fresh specimens of this variety, which is well distinguished by the long serrulate awns borne by the glumes of the fertile spikes, were sent me last June by Mr. R. M. Barrington of Fassaroe, who had gathered them at Clonea marsh, Co. Waterford, where he noticed the plant growing the previous year. The name is confirmed by Mr. Arthur Bennett, who has kindly examined specimens. There does not appear to be any previous Irish record for this variety.

N. COLGAN.

Dublin.

***Festuca rigida* at Lisburn.**

As a grass of rare occurrence in District XII. of *Cyb. Hib.*, and one which has been reported from only one other locality in County Antrim, it may be of interest to note that this species has this year been observed flowering at the end of June (and then becoming purple) on a wall within the Lisburn borough boundary.

J. H. DAVIES.

Lisburn.

Some new County Records.

During a short visit to the island sanctuaries of the Shannon and Lough Key in July of last year, a few interesting botanical notes were made. Amongst these the following appear to be new county records. The numbers placed after the plant-names denote the topographical divisions.

Orobanche Hederæ, Duby, 23 and 24.—On the old church, Hare Island, Lough Ree. Co. Westmeath, and on Teampul More, Inchcleraun, in the same lake, and in Co. Longford.

Lathyrus palustris, Linn., 18.—In a marsh near Clonmacnoise, King's Co. (found by Rev. Wm. Colgan).

Epilobium angustifolium, Linn., 28.—In considerable quantity on the cliffs of Carrignahona, adjoining Carrowkeel Mountain, Sligo, in association with the rare *Meconopsis cambrica* Vig., the latter being new for this station, though not for the county.

To these records may be added *Equisetum hyemale*, Linn., 31.—Observed a few days earlier by a stream in the Carlingford Mountains above Omeath, at a height of 800 feet; and *Crepis biennis*, Linn., 21.—Long expected in Co. Dublin, and found at length in profusion towards the end of June of the present year in a meadow near Killiney station and on the adjacent railway banks.

NATHANIEL COLGAN.

Sandycove, Dublin.

ZOOLOGY.**Abnormal Land Mollusca from Bundoran.**

In continuation of those recorded (*I. Nat.*, 1900, pp. 162 and 271) by Mr. Green and myself, Mr. Brockton Tomlin, of Chester, has in his collection now, or has passed through his hands in the last few years, 400 reversed shells of *Helix nemoralis* from Bundoran. These, with 100 others I have heard of since, bring the total up to over 1,400. That they are

still alive there we now have clear proof. Dr. Chaster, during our visit there in Sept., 1900, found one alive, and I have seen several other quite fresh specimens. Mr. Tomlin has also 28 good scalariform examples, some rather better than those figured on Plate 5, 1900—one of his shells measures 34×19 mm.—in addition to a number of high-spired and other curious forms. The average Bundoran specimen is 16×21 mm.

R. WELCH.

Belfast.

Autumn Lepidoptera at Poyntzpass.

During last autumn Lepidoptera were not by any means plentiful here. I sugared almost every night from August 24th to October 31st, but on no night had I any great number of moths at the sweets. Ivy blossom I found even less productive; some nights there was not a moth to be seen in the flowers, and never did I see more than a dozen moths on one night, though the ivy is one great sheet over the gable wall of this house. In the latter part of August several *Heliophobus popularis* flew into my dining-room, attracted, no doubt, by the lamplight. My earliest capture at sugar was *Noctua glareosa* on August 24th, and I continued to take it till the end of September. Other captures were *N. rubi*, *N. xanthographa*, *N. c-nigrum*, *Agrotis suffusa*, *A. saucia* (a single specimen), *A. segetum*, *Hydræcia micacæa*, *H. nictitans*, a beautiful chestnut form; *Gonepteryx libatrix*, *Orthosia ferruginea*, *O. pistacina*, these two species were very plentiful, and exhibited considerable variation; *O. macilenta*, *Miselia oxyacantha*, in some numbers; *Aporophyla nigra*, a beautiful jet black specimen, unfortunately only one appeared; *Scopelosoma satellitia*, *Cerastis vaccinii*, *Calocampa exoleta*, and *C. velusta*, the former of these is much the more common here. At ivy the only capture that need be mentioned is *Orthosia lota*, of which I obtained one specimen, a second I took on a table in an inner hall, though how it got there I cannot imagine, as there is no immediate access to it from outside; perhaps it had been sitting on my lantern. I took *Plusia gamma* in a window of this house, *Thera variata* and *Cidaria miata* flying about fir trees, *Peronea variegana*, *Depressaria applanata*, and *D. arenella* sitting on the trunks of fir trees near sugar, *Epione apiciaria* and *Teras contaminana* flying round the lantern, and *Ecophora pseudopretella* in the house. The late autumn was very mild and fine at times, and, as a consequence, some butterflies remained active till very late in the season; thus on October 13th I saw *Vanessa atalanta* and *Pararge egeria* flitting about in my garden, while on November 1st I saw *Vanessa urticae* flying in a sunny corner of one of my fields, where it was vigorously but unsuccessfully chased by some of my hens.

W. F. JOHNSON.

Poyntzpass.

Hymenoptera of the South-west.

As a further result of Colonel Yerbury's entomological work in the south-west of Ireland during July and August last, we have now a detailed list of his Hymenopterous captures. (Hymenoptera collected by Colonel Yerbury in S.-W. Ireland in 1901; Aculeata by Edward Saunders, F.L.S.; Chrysididæ and Tenthredinidæ by Rev. F. D. Morice, M.A.; Ichneumonidæ (including a species new to our fauna) by Claude Morley, F.E.S. *Entomologists' Monthly Magazine*, xxxviii., pp. 51-55.) The Aculeates—including the Ants, Bees, and Wasps—naturally received the greatest attention; seventy kinds are recorded. The following extracts from Mr. Saunders' report on the collection are noteworthy:—"Amongst the Aculeates are many species of considerable interest, although there is none actually new to our [British] lists. All, however, are interesting, on account of the localities, and some on account of their very unusual coloration. Amongst the latter may be mentioned specimens of *Crabro dimidiatus* which have entirely lost their yellow markings; a small black ♂ of *C. iv-maculatus* belonging to the variety *geniculatus*. The melanic variety of *Megachile willughbiella* is most striking; the collection also contains a very dark *Bombus smithianus* ♂ of quite different coloration to any I have seen before." A comparison of this list with the recorded Irish species shows that no fewer than twelve were previously unknown to occur in Ireland. These are:—*Pompilus unguicularis*, Thoms.; *Crabro cetratus*, Shuck.; *C. iv-maculatus*, var. *geniculatus*, Shuck.; *C. chrysostomus*, Lep.; *Odynerus trifasciatus*, Oliv.; *Colletes montanus*, Mor.; *Andrena fuscipes*, Kirby.; *A. Cetti*, Schr.; *A. humilis*, Imh.; *Nomada roberjeotiana*, Z.; *Megachile willughbiella*, Kirby; *Bombus jonellus*, Kirby. The wood ant, *Formica rufa*, and the wasp, *Vespa austriaca*, are also very notable species; both were found at Parknasilla, the ant also on Valentia Island. Several of these insects are rare or local in Britain, such as *Andrena Cetti*, which occurs chiefly in the south of England, while *Colletes montanus* has only been recorded from one locality in Ayrshire.

Muller's Topknot in Belfast Lough.

On 7th July Mr. Wm. Scott, of Bangor, in this county, sent me a fish which had been taken in a lobster-pot near there that morning, requesting me to let him know "what kind of fish it is?" I found it to be a Muller's Topknot, *Zeugopterus punctatus* of Day, *Rhombus hirtus* of Yarrell. It measured 6½ inches long by 4½ inches in breadth. So far as I am aware, this is only the second record from Co. Down (Thompson records one occurrence at Ardglass in 1835), and the first in Belfast Lough. The overlapping of the dorsal and anal fins by the caudal fin as figured by Couch and Day, was distinctly marked.

R. LLOYD PATTERSON.

Holywood, Co. Down.

Holwell's Redpoll on Achill.

In the *Zoologist* for July, Mr. F. Coburn, of Birmingham, records the occurrence of the first Irish-taken specimen of *Cannabina Holwelli* on Achill, and states that the bird "is now in the Baylis Collection." No information is given as to who shot the bird. If the captor is a native of the island, we should much like to know why he prefers parting with it to a private English collector to offering it to the National Museum of his own country.

The Siskin near Poyntzpass.

In December last I noticed a number of these beautiful little birds at Poyntzpass on some Alder trees a short distance outside the village. From this they went to a wooded glen nearer the village, and here several were captured by some boys. I was afraid that, owing to the persecution they received, they would leave the place, but I was delighted to observe a pair in my own grounds last week, so that they are probably breeding here.

W. F. JOHNSON.

Poyntzpass.

Ravens in Co. Antrim.

To the *Zoologist* for May Mr. W. C. Wright contributes a note on the nesting of a pair of Ravens in Co. Antrim, as observed by him.

Golden Eagle in Co. Donegal.

W. H. Workman and W. C. Wright record in the *Zoologist* for April the capture of a Golden Eagle in Co. Donegal. We are glad to see that Sir Jas. Musgrave is doing his best to protect these grand birds in their breeding haunts in that county.

Pomatorhine Skua on the Donegal Coast.

On 6th May last Mr. Barrett shot a Pomatorhine Skua (*Stercorarius pomatorhinus*, Temminck), on Inniskeel Island. It was sent to Mr. E. M'Court, our local bird-stuffer, for preservation. It was in the entirely brown plumage, the vertically-twisted central tail feathers being very conspicuous. It struck me that the 6th May was a very unusual date for this skua to be found on our coast.

D. C. CAMPBELL.

Londonderry.

Great Auk in Co. Clare.

I have the pleasure to announce the recent discovery of bones of this extinct bird in the kitchen-middens of the Co. Clare coast. These consist of a tibia from near Lahinch, and a coracoid from the coast north of Doonbeg. They were found by Mr. James Duffy, who accompanied me. In both cases the relics occurred (like the Great Auk bones in Co. Waterford) on the surface between the sand-hills. The other objects found there were slabs of sandstone used for hearths, broken and burned pot-boilers in profusion, with multitudes of shells of limpets and periwinkles, bones of horse, cow, pig, goat, or sheep, and horns of Red Deer; with these, we have found in Co. Clare some peat and bog-wood.

It seems probable that the Great Auks, whose bones have occurred amid such surroundings in Antrim, Waterford, and Clare, were been used for food by the ancient inhabitants; and where they have existed in such widely-separated localities, we need not despair of finding remains of this species on other parts of the shores of Ireland.

R. J. USSHER.

Cappagh, Co. Waterford.

Iceland Gull at Moyview.

I was pleased to see Mr. D. C. Campbell's notice of Iceland Gull (*Larus leucopterus*) at Londonderry, seen on 7th of April. We also had a visit from one of that species of gull here, on the 25th of January, when I observed a bird in that creamy-coloured plumage of the second year resting on the water of one of my fields; and again, on the 11th February, I saw probably the same bird on the shore, with some Herring Gulls, near the shipping quay, a mile from Ballina.

ROBERT WARREN.

Moyview, Ballina.

Breeding Habits of the British Squirrel.

In recent issues of the *Irish Naturalist* I have noticed some letters on the above subject. Perhaps you may think it worth while to reproduce the following, being part of a note, entitled "Young Squirrels," which I contributed to the Natural History column of the *Irish Sportsman* of October 18th, 1892. The *Irish Sportsman* is out of print, and its files are probably inaccessible to naturalists. Further, the note includes all information on the subject which I was able to collect at the time of writing—

"To the *Zoologist* for March, 1891, Mr. E. W. H. Blagg, of Cheadle, Staffordshire, contributed an interesting note on this point, in which

he stated that the result of his experience led him to differ from Bell, our standard authority on the British mammalia. Bell, in his 'History of British Quadrupeds,' at page 278 of the 2nd edition, published in 1874, writes of the squirrel that 'the female brings forth three or four young in the month of June, which receive the most assiduous care from both parents, and remain with them until the following spring, when they separate and choose their mates.' Mr. Blagg, however, refers his readers to *The Field* for March 6th, 1886, where a correspondent records finding young squirrels, 'nearly as large as a rat,' in the second week of February, 'in a peculiarly inclement and backward season.' 'We may assume,' continues Mr. Blagg, 'those squirrels were born some time in January. In this neighbourhood I have three times come across nests of young squirrels; on each occasion at the beginning of April. They appeared to be several weeks old, and must have been born at least as early in the year as the month of March.' Mr. J. E. Harting's experience is also opposed to the testimony of Bell as regards the time of producing the young of the squirrel. He has found newly-born squirrels on the 21st March (three young), 19th April (three young), 26th April (four young), and 29th April (two young). 'Those found at the end of March and beginning of April were naked and blind; those taken at the end of April were about three parts grown. The old squirrels, in case of danger, remove the young from the nest or "drey" to some hole in a tree, whither they carry them one by one in the mouth, just like a cat carries her kitten. One of the prettiest sights in the world is to see an old squirrel teaching a young one to jump.' In England we ourselves found three young squirrels, with their eyes open, in a 'drey' near Oxhey, in Middlesex, on May 28th, 1887, and on the same day we came across another lot of much smaller youngsters in a hole in a tree. All the above records of the finding of young squirrels disagree with Bell's testimony, but on one occasion we came across a family of them which must have been born not earlier than in July. This was on August 14th, 1891, when we were shown two young squirrels which had recently fallen out of their 'drey.' They were still living when we saw them, but were so young that their eyes had not yet opened. Possibly this was the second litter produced by the same parents in the year."

Since that time I have received two additional notices of the finding of young squirrels in the months of March and April, viz. :—

April 15th, 1895.—Six young (furless and with unopened eyes), found in a hole in a tree at Ashburnham Park, Sussex, by N. F. Ticehurst.

March, 1896 (middle of).—Four young, with unopened eyes, found in Northamptonshire by the keeper of the late Lord Lilford.

G. E. H. BARRETT-HAMILTON.

Redefort-road, Orange Colony.

REVIEWS.

IRISH PLANT DISTRIBUTION.

On Types of Distribution in the Irish Flora. By R. LLOYD PRAEGER, B.A., B.E.—*Proc. Roy. Irish Acad.*, Vol. xxiv., 1902.

Irish plant distribution already possesses a considerable literature of its own, but, perhaps, nowhere will the student find a more interesting *resumé* of the subject than is set before him in this paper of sixty pages. Its most obvious merit, one which even the veriest skimmer cannot fail to recognise, is the skilful use which the writer has made of the graphic method of exhibiting complex groups of facts. No less than sixty-two charts serve to visualize for the reader the various generalizations which may be drawn from the large mass of material made available of late years in the second edition of *Cybele Hibernica* and in the author's own *Irish Topographical Botany*. The chart on page 8 showing the distribution in Ireland of the Scottish type plants, the other on page 11 dealing with the Highland type, and those on pages 19 and 20 dealing with the calcicole and calcifuge groups, may be taken as examples of the great advantage which the graphic method has over unaided letterpress.

The paper is divided into two fairly equal sections. The first is concerned mainly with the relations of the Irish to the British flora, and exhibits in an excellent set of charts the distribution in Ireland of Watson's well-known types. In this section, too, are some well thought out paragraphs on the calcicole and calcifuge groups, a series of charts showing the distribution of mountain land in Ireland, and some discussion of such abstruse questions as the probable cause of Ireland's poverty in Germanic species, or the anomalies in the distribution of her Highland type plants. On the whole, however, there is little in this first section, interesting as it is, to call for special comment. A passage on page 22 may be noted as an example of the critical operation known as breaking a butterfly on the wheel. The butterfly in this instance is a simile used in the Introduction to the Second Edition of *Cybele Hibernica*, where the plant migration which gave to the British Isles at the close of the last glacial epoch the bulk of their present flora, is likened to an army with advance-guard and rear-guard. It is the vice of all similes that they limp when urged too far, and the plant-army simile is no better in this respect than any other. But it presents, at all events, a picture to the mind's eye; and this first duty of a simile the plant-empire simile, which Mr. Praeger proposes as a substitute, is unable to discharge. There is a curious oversight in this same passage, where Mr. Praeger speaks of the plant-army having to overcome a "presumably weaker flora which was in possession of the ground," the fact being that the ground in question at the close of the glacial epoch was quite naked, a veritable *tabula rasa* from the botanical point of view. There appears

to be some confusion of thought implied, too, in the reference to successive waves of plant migration, since the question under discussion is merely the floral re-peopling of Ireland on the close of the last glacial period.

The second, and for Irish botanists the more interesting, section of the paper deals with what may be called the internal relations of the Irish flora. About two-thirds of our Irish species have been arranged by Mr. Praeger under seven types. One of these, the General type, calls for no remark. Of the remaining six, all of which demand careful discussion, four are well recognised, while two others, the Central and the Marginal, are here proposed for the first time.

First in order comes the Central type, defined as made up of species found chiefly in the Central Plain, and often extending to the margin of the island on the east and west, but showing a marked restriction of range towards the north and south. The north and south range laid down for this type appears to be little less liberal than its east and west range, the northern boundary being a line joining Sligo Bay and Dundalk Bay, the southern a line joining Waterford with the Shannon mouth (pp. 32-33). The title, Central, here is somewhat ambiguous. Though suggesting a purely inland area, it is applied to one which stretches right across Ireland from sea to sea. If the term is to be used in the former sense, and the placing of the focus of the group in Westmeath would seem to show that this is the author's intention, no less than ten species, which range right across the island without showing any marked increase towards the centre, should be excluded. These species are—*Poterium Sanguisorba*, *Myriophyllum verticillatum*, *Erigeron acre*, *Carlina vulgaris*, *Centaurea Scabiosa*, *Crepis taraxacifolia*, *Tragopogon pratense*, *Gentiana Amarella*, *Juncus obtusiflorus*, and *Lemna polyrrhiza*. Along with these might be placed a few others, such as *Thalictrum flavum*, *Cornus sanguinea*, *Ophrys muscifera*, and *Equisetum variegatum*, whose focus is very doubtfully Central, the number of the Central type species being thus reduced from 36 to 22. The chart on p. 36 shows the inappropriate focussing of the group whose development in the western division of S.E. Galway is little less full than it is in Westmeath. Median might be suggested as a better title for the group than Central, and were this title to be adopted, the objections just made would lose much of their weight. But the institution of a Median type would appear to demand a tri-partite division of the island into Northern, Median, and Southern, and whatever the advantages of such a scheme might be, simplification would not be one of them, since the very natural groups of eastern and western plants could not be merged in any of the three divisions.

While the distinctive feature of the Central type is aggregation, the criterion of the Marginal type is, in a certain sense, dispersion. This type is defined as made up of plants, "characterized by a tolerably even though frequently discontinuous range through those divisions which lie around the margin of the island, and by an avoiding of the Central Plain" (p. 33). We should expect to find plants of this type occurring in a large proportion of such of the topographical divisions of Ireland as are

either purely maritime or approach closely to the sea. The number of such divisions is about 30; and it would seem *prima facie* that any species occurring only in 10 or a less number of these divisions must fail to have the tolerably even marginal range necessary to qualify it for admission to this type. There are 11 such species given in the list of Marginal plants on p. 37, and examination shows that 8 of these, while they satisfy the condition of a general avoidance of the Central Plain, fail to establish for themselves what can be considered, even on the most liberal interpretation of the words, a tolerably even, though frequently discontinuous range through the marginal divisions. These species are the following:—*Subularia aquatica*, *Sagina subulata*, *Elatine hexandra*, *Trifolium fragiferum*, *Carum verticillatum*, *Hieracium Schmidtii*, *Pilularia globulifera*, and *Chara canescens*. If the Highland type be retained for Ireland, and in spite of its anomalies of distribution so forcibly urged by Mr. Praeger towards the close of his paper, it seems advisable to do so. eight species of this type must be further deducted from the proposed list of Marginal type species, reducing the group from 46 to 30. So revised, the Marginal type would no doubt be a small one, but if we are to have many and definite types of distribution in Ireland we must be content to have them small.

Next in order to the Central and Marginal types come what may be conveniently spoken of as the provincial types. In his remarks on p. 32 Mr. Praeger has well shown that much less diversity is to be looked for in the Irish than in the British flora. The area of our island is, in fact, too small for the development of such broad differences as are found in Great Britain, and the seeker after Irish types has need to guard himself against the temptation to over-elaborate his material. Still, the leading diversities of the Irish flora are sufficiently well-marked. The existence of four distinct floral groups, an eastern and a western, a northern and a southern, has long been recognised, and might, indeed, have been inferred *a priori* from a consideration of obvious climatic differences. In these groups, the chief members of which are set out in the Introduction to the Second Edition of *Cybele Hibernica*, will be found the groundwork of the provincial types as proposed in the paper now under review. Various titles might be suggested for these groups by those who are not content with the bald nomenclature drawn from the cardinal points. But perhaps no choice could be happier than the one Mr. Praeger has made in adopting, with slight modification, the Latinized forms of the old Irish province names in use as early at least as the twelfth century. In changing the Momonia and Conatia of Giraldus Cambrensis to Mumonia and Connacia, a closer approach has been made to the original Gaelic without violating English ideas of euphony.

The definition of these types is given on p. 34, where it is stated that they are "named after the four provinces of Ireland in which each type respectively reaches its maximum, namely: Ultonian type in Antrim, Mumonian type in East Cork, Lagenian type in Dublin, Connacian type in West Galway." We might fairly conclude from this passage that the area of each type would be roughly co-extensive with the province whose

name it bore, and that the constituent species of each would be such only as found their focus or centre of development within the appropriate province. A study of the map on p. 34, and of the lists of species given further on, shows, however, that such a conception of the areas and constituents of these types would be far more limited than the author's conception. The areas as laid down in this map are, in fact, to use an appropriate botanical term, imbricate, so deeply imbricate, indeed, that the amount of overlap in some cases is equivalent to the addition of a second province. Thus the area of the Ultonian type, as laid down on Mr. Praeger's map, includes, along with Ulster, almost the whole of Connaught; that of the Mumonian type includes, along with Munster, almost the whole of Leinster; that of Lagenia includes, along with Leinster, the greater part of Ulster and a large slice of Munster; while the Connacian area includes, in addition to Connaught, the greater part of Munster with north-west Ulster.

A certain degree of overlapping of distributional areas is unavoidable in any scheme of topographical plant groups, but the effect of such wide overlapping as is provided for in the proposed scheme of provincial areas has two undesirable results—it renders the title of each plant-group inappropriate, and to a certain extent misleading, while it obscures the special character of the group by the introduction of discordant elements. These objections apply with less force to the Ultonian group than to any of the others. The large proportion of its members, no less than 82 per cent., occurring in Antrim, where the focus of the group is placed, shows that it is on the whole truly Ultonian. The exclusion of a few species doubtfully focussed in Ulster, such as *Vaccinium Vitis-Idæa* and *Potamogeton filiformis*, would make this group even more natural.

When we come to the Mumonian type, whose focus is placed in East Cork, we find that the maximum percentage of the group found there sinks as low as 60, suggesting that the group is largely constituted of elements not truly southern. Examination shows this to be the case. The list includes at least 12 species which do not find their focus anywhere in Munster, and whose inclusion only serves to obscure the true character of the group. The most prominent of these species are *Viola hirta*, *Leontodon hispidus*, *Chlora perfoliata*, *Atriplex portulacoides*, *Potamogeton flabelatus*, and *Bromus erectus*. The list at the same time includes two species, *Campanula Trachelium* and *Colchicum autumnale*, which are altogether absent from Munster. The type might advantageously be reduced from 66 to 50 species.

The Lagenian type shows the high percentage of 80 in its focus, the County of Dublin. Yet several of its species, for instance, *Lepidium hirtum*, *Scilla verna*, *Lemna gibba*, *Carex dioica*, and *Hordeum secalinum* do not properly belong here, since they cannot be said to find their focus anywhere in Leinster; two others, *Elatine Hydropiper* and *Zannichellia polycarpa*, do not occur at all in that province. On the whole, however, this group is a natural one.

In the focus of the Connacian type, West Galway, the percentage of the group falls to 60, or 37 out of a total of 63, suggesting, as in the case

of the Mumonian type, the intrusion of foreign elements whose focus lies outside of the province which gives its name to the group. Examination of the list on page 49 shows that this is so. Four of the species there given as Connacian, *Bartsia viscosa*, *Simethis bicolor*, *Scirpus triqueter*, and *Nitella Nordstedtiana*, are altogether absent from Connaught, and at least 5 others, *Euphorbia hiberna*, *E. amygdaloides*, *Juncus tenuis*, *Naias flexilis*, and *Trichomanes radicans*, while they occur within the province, cannot be said to find their focus there, so that the group would gain in definite character by the reduction of its members from 63 to about 50.

To sum up this necessarily minute criticism of the proposed provincial types, it may be said that the Ultonian and Lagenian are the most definite, the Mumonian and the Connacian the least so. These facts come out clearly in the distributional charts of the types given on pp. 42, 45, 46, and 50, where the northern and eastern types are shown with definite foci, while the western and southern types appear each with three distinct centres of high development, three maxima, in short, if we may for the occasion take Sir Boyle Roche as our literary model. The Mumonian type, it will be seen, has two of its three centres of high development in Leinster, the Connacian has two of its three centres in Munster.

There is no space left here to touch on many other interesting aspects of distribution discussed or suggested in Mr. Praeger's paper. To say that it is full of controversial matter, on which the opinions of competent judges may differ widely, is only to say, in other words, that it does not deal in platitudes. Every page of it bears the impress of thought and research and unstinted labour, and the net result is a valuable contribution to Irish topographical botany, which no student of the subject can afford to neglect.

N. C.

ECONOMIC ENTOMOLOGY.

The Irish Bee Journal (Organ of the Irish Bee-Keepers' Association). Edited by Rev. J. G. DIGGES, M.A. Vol. I, 1901-2, pp. 138.

Our apiarian contemporary, whose first number we noticed last summer, has now completed its first volume. The success that has attended this useful little magazine may be taken as an index to the growth of bee-keeping in Ireland, and it is to be hoped that the industry and the *Journal* may continue to grow year by year to their mutual help and benefit. A story in the March number well illustrates the economic importance of the subject—"A vagrant swarm, lighting upon a farm in County Wexford fourteen years ago, aroused in the captor an interest which now is represented by an apiary of 84 stocks, producing last season 4,000 sections with a return of £100 for honey." The bee-keeper will find the pages of the *Journal* full of hints both scientific and practical.

Injurious and Useful Insects: an Introduction to the Study of Economic Entomology. By L. C. MIALL, F.R.S. London: George Bell and Sons, 1902. Pp. 256. Price. 3s. 6d.

We have often been asked by students and others interested in the practical study of entomology to recommend a small handy book, reliable in its science and sound in its practical advice, that might serve as an introduction to the subject. Hitherto there has been no such ideal elementary work in our language, for the late Miss Ormond's writings, with their scanty treatment of biological questions and their wealth of detail regarding practical remedies, are more adapted for cultivators who have missed the benefit of a scientific training than for beginners who want to get at the reason of things. Professor Miall's admirable little book completely supplies this felt need, and we can hardly give it higher praise.

The book is divided into four parts. First comes an account of the outward and inner structure of the Cockroach, as a typical insect; then follow fairly detailed and beautifully graphic accounts of the form and life history of well-selected common insects—almost all of economic importance, six or seven species representing each of the principal orders. The third section gives a summary of the orders of insects, with notes on the more important families. A short but most suggestive section on the "Destruction or Mitigation of Insect Pests" closes the book, and there are remarks on this point in connection with the special injurious insects described in Part 2.

It may be thought this last-named practical aspect of the subject should have received more attention, but we believe that Prof. Miall's treatment of it is the best possible in an elementary book. He gives a number of general principles on which the practical work of the economic entomologist depends, and detailed accounts of the successful methods that have been adopted against two especially destructive insect pests in America. Laying stress on the importance of expert knowledge of the subject, he points out how much work remains to be done on it in our own islands. Certainly the student who has gone practically through the "lessons" of this little volume will be equipped for investigating the ravages of any particular insect-pest he may meet, and learning how to fight it. And his work is likely to be successful, because he will have been taught to study insects, as any other living creatures in the right way—to observe and to think for himself.

The style of the "lessons" is admirably clear, and the interest of each life-history is well maintained throughout. The only change in the general plan of the book that we can suggest as an improvement, would be the association of the second and third parts—so that the systematic account of each order and its families might follow immediately the accounts of its typical members. Perhaps a certain amount of repetition might thus have been saved, a reference to any particular order facilitated. The figures—over 100 in number—are, with few exceptions, good and well chosen.

G. H. C.

NATURE-STUDY.

The Face of Nature : Popular Readings in Elementary Science. By Rev. C. T. OVENDEN, D.D. London : John Murray, 1902. Pp. 188. Price 2s.

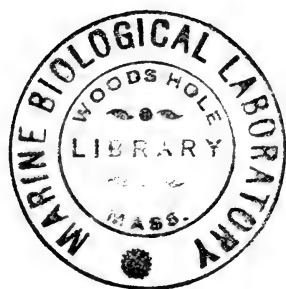
This attractive little book contains the substance of four lectures delivered to "such mixed audiences as a clergyman or a layman can gather together in a parish hall." The wish to spread scientific knowledge in this way is altogether praiseworthy, and many valuable facts are set forth clearly and pleasantly by Canon Ovenden in the lectures now published. The first deals with meteorology, dwelling specially on weather forecasting; the other three with natural history. Of these, one on "Vegetable Life" is very bright written, but somewhat marred by the constant suggestion that the adaptations of plants to their surroundings are due to the purposeful endeavours of the plants themselves. This seductive idea must be regarded as distinctly misleading for a "mixed" audience. The "Record of the Rocks" sketches the history of the Solar System in general, and the earth in particular, from the primeval nebula to the mammoth, in forty-four pages! The physical aspect of the subject is more adequately dealt with than the biological; it is disconcerting to find our old acquaintance, "Eozoon," still set forth as an unquestioned animal, and to be told that *Pterygotus* "might be called the champion of the lobster family," or that *Mastodon* was "related to the family of hogs." The concluding lecture, on "The Story of a Common Stone," is an admirable sketch of the testimony borne by drift and perched blocks to the former action of ice in our islands. This will surely fulfil the author's wish in leading those who read to use their eyes in observing for themselves the things they see around them. Some geologists might consider the statements of Croll's theories of the causes of a glacial period, and Prof. Jas. Geikie's series of interglacial periods, a little too dogmatic. But the reader who is led by such lectures as these to study natural science for himself, will soon find out that naturalists do not always agree with each other's theories. The book is illustrated by outline sketches, so drawn that they may be copied as lantern slides.

G. H. C.

NEWS GLEANINGS.

Mr. A. R. Nichols.

Our best congratulations to Mr. A. R. Nichols, of the Dublin Museum, on whom the Degree of M.A. has lately been conferred by the University of Cambridge.





A. H. HALIDAY.

NATURALISTS OF IRELAND.

I.—ALEXANDER HENRY HALIDAY.

BY PROFESSOR E. PERCEVAL WRIGHT, M.D.

ALEXANDER HENRY HALIDAY was the eldest child of William Haliday and Marian Webster. He was born on the 21st November, 1806, at Clifden, County of Down. He entered Trinity College, Dublin, in his sixteenth year, and obtained the gold medal in classics at his degree examination in 1827. Shortly afterwards he was called to the Irish Bar, joining the north-east circuit, but he very soon retired from practice. From his early college days he was a student of nature, endowed with a very retentive memory, marked delicacy of touch, and he was an excellent linguist; research, however difficult, was but a delight. Before he left college he had sent his first paper ("Notices of Insects taken in the North of Ireland") to the *Zoological Journal*, where it was published, with a highly appreciative note by J. F. Stephens (*loc. cit.*, vol. iii., p. 500). In 1833 he published in the *Entomological Magazine*, a "Catalogue of the Diptera, occurring in the neighbourhood of Holywood, in the County of Down." He also commenced the publication of an account of the *Ichneumonones minuti* of Linnæus. These memoirs were written in Latin, and not only by the novelty and interest of the subject, but by the classic elegance of the style in which it was treated, placed their author in the fore rank of entomologists. "Nothing," writes J. O. Westwood, in a letter to the writer of this brief notice, "has ever exceeded the clearness and precision of his general views, as well as his minute and elaborate details."

A nearly complete list of his writings down to 1862 will be found in Dr. Hagen's *Bibliotheca Entomologica*, but several critical notices which appeared in the *Natural History Review*, not being signed or initialled, do not appear in the list. The opportunity is taken of mentioning that Loew's notice of the *Insecta Brit. Diptera*, which was published in the *Natural History Review*, was translated by Haliday, who omitted all references to himself that were in the manuscript. Professor Westwood thought that Haliday's monograph of the

Thripsidæ, with its wonderful series of illustrations, published in the British Museum Catalogue of Homoptera, was a contribution to entomological literature of very special merit, while his memoir on the "Affinities of the Aphaniptera among Insects" may be referred to as one of the most important of his later writings.

Coming to reside in Dublin in the early fifties, he took an active part in the work of the Dublin University Zoological and Botanical Association, which had been founded under the auspices of Robert Ball, W. H. Harvey, and George Allman; he also very materially assisted in the editing and publishing of the *Natural History Review* until it was transferred to London.

Towards the close of 1861 his state of health led him to try the effect of a change of climate, and he went to Lucca to reside with a near relative. The immediate result was good; and his cousin taking up her permanent abode in a villa, the property of her husband, on the slopes of San Concordia, about five miles from Lucca, Haliday occupied portion of the villa, bringing out his collection of books and insects. From thence he made many excursions, visiting the region of the Carrara range and the Appenines above Pistoja; at other times the woods and shores of Viaregio and Spezia, the latter not then a fortress; sometimes to Sicily, and over its fertile plains and up its wondrous mountain. Collections of Diptera and Hymenoptera were made for future work and for exchange.

In 1867 he joined very cordially with Professors Targioni-Tozzetti and Stefanelli in founding the Italian Entomological Society, and he commenced the investigation of the subject of insects injurious to the Olive. A. H. Haliday died on the 12th July, 1870, after a short illness. I take the liberty in bringing this notice to a close, of quoting from an appreciation of him by Baron Osten Sacken, which is shortly to be published. It is the expression of the opinion of one in every way capable of judging, and is, therefore, of more value than any words of mine could have about my life-long friend. "He had an intense desire for completeness and perfection, which was quite disinterested, because shy of publicity; he had an intense desire of being useful, by imparting useful knowledge to others, unmindful of the amount of work it involved."

The accompanying portrait (Plate 2) has been enlarged from a photograph taken in Rome about 1866.

Trinity College, Dublin.

BIBLIOGRAPHY.

As mentioned above, a list of Haliday's writings up to 1862 may be found in Hagen's *Bibliotheca Entomologica*, Leipzig, 1862 (pp. 334-6, 379). This list contains forty-two titles, and gives a record of the bulk of the great entomologist's work in a form most convenient for reference by his followers of to-day. It may be worth noting that there is a copy of Hagen's book in the Natural History Library of the Dublin Museum.

The following titles, mostly compiled from the Royal Society's *Catalogue*, are given as a supplement to the list in the *Bibliotheca Entomologica* :—

Characters and synoptical tables of the order (vol. i., pp. 1-9), of the Empidæ (vol. i., pp. 85-88), and of the Syrphidæ (vol. i., pp. 234-7), and the chapters on the Dolichopidæ (vol. i., pp. 144-221), the Borborides (vol. ii., pp. 171-184), and the Hydromyzides (vol. ii., pp. 247-269); also the Addenda and Corrigenda (vol. iii., pp. xi.-xvi.) in Walker's "Insecta Britannica Diptera," 3 vols. London, 1851-6.

Physopoda (in "List of the Specimens of Homopterous Insects in the Collection of the British Museum," Part iv., pp. 1094-1118, pls. v.-viii.). London, 1852.

Iapyx, a new genus of Insects belonging to the stirps Thysanura in the order Neuroptera. *Trans. Linn. Soc.*, vol. xxiv., 1864, pp. 441-447. See also *Linn. Soc. Journ. (Zool.)*, vol. viii., 1865, pp. 162-163.

Description du *Periphyllus laricæ*, n.sp. *Ann. Soc. Entom. Fr.*, vol. viii., 1868, pp. xi.-xiii.

Description d'une espèce nouvelle de la famille des Curculionites :—*Rhynchites coligatus*. *Ann. Soc. Lin. Lyons*, vol. xviii., 1870, p. 125.

This article is the first of a proposed series on the old-time naturalists of Ireland. We hope that in conjunction with the obituary notices of those who have passed from us in recent years this series will form a fairly complete record of the lives and works of the men who have contributed to natural history studies in Ireland.

EDS.

SOME PLANTS OF THE NORTH-EAST COAST.

BY R. LLOYD PRAEGER.

DURING the present season I devoted a few days to endeavouring to determine or confirm the northern limit of some of our rarer plants on the eastern side of Ireland, and during the process some other species of interest turned up.

Over sixty years ago, John Ball recorded¹ *Trifolium striatum* and *Trigonella ornithopodioides* as found by him on the summit of Clogher Head, Co. Louth. The next botanist to make observations on the flora of the headland was Cecil Butler, who in 1890² added *Trifolium arvense*, but does not mention having seen either of the two rare plants found by Ball. I was there in 1896, too late to look for Ball's plants, but noted *Trifolium fragiferum* by the shore near the Head. Of the four *Leguminosæ* named, the second and fourth found here their northern limit on the eastern side of Ireland; this remark applied also to another Clogher Head plant, namely, *Statice occidentalis*. On July 3 last I spent three hours at Clogher Head, endeavouring to refind Ball's clovers. *T. striatum* turned up almost at once, among rocks half-way between the road and the coastguard watch-house on the highest point of the Head. With it was *T. filiforme*, not previously known from Louth, here growing in ground that never had nor could be cultivated—a quite satisfactory station. Both these clovers occurred again around a splendidly glaciated sheet of rock at an equal distance on the opposite side of the watch-house. My scrutiny revealed no trace of *Trigonella*; and this in spite of the fact that it was just the season for it, for I had gathered it in abundance at Howth three days before. Two other plants recorded by Ball were seen in profusion, namely, *Scilla verna*, and a white-flowered form of *Anthyllis Vulneraria*; of the latter a rose-red form occurred likewise: the white form is commoner at Clogher Head than the type. Riding back, I saw on a ruined cottage near Termonfeckin a quantity of *Festuca Myuros*, new to Louth, and

¹ Botanical notes of a tour in Ireland. . . . *Annals of Nat. Hist.*, II., 28–36. 1839.

² New Stations of Irish Plants.—*Journ. Bot.*, xxviii., 361–2. 1890.

not previously known so far north in the east of Ireland; also *Anthriscus vulgaris*. By the Boyne, a mile below Drogheda, were *Torilis nodosa*, *Salvia Verbenaca*, and *Allium vineale*, rare in Louth.

A few days later I had an opportunity of attempting to verify another old record for *Trifolium striatum*, namely, that of Whitehead in Antrim, by far its most northerly station in Ireland. It was collected about here in the sixties by several botanists of the last generation, and John Templeton had previously (1811) gathered it at Rhanbuoy, a few miles to the westward; but it had not been seen in the North-eastern district since. Walking from Whitehead towards Kilroot to examine the interesting fossiliferous glacial gravels recently discovered at Cloghan by Mr. Welch, the plant turned up at once, in profusion, on the bank over the railway line just beyond the tunnel. Thence I traced it as far as Cloghan Harbour; and then climbing the steep slopes, it was found to be abundant right up to the county road, nearly 300 feet above the sea. I traced it back along the road, growing on each side, to the rock-cutting at the right-angle turn just above Whitehead. Over this area, a space of about three-eighths by one-eighth of a mile, wherever the ground is dry and the herbage low, *T. striatum* grows in the greatest abundance among *Thymus*, *Anthyllis*, *Lotus corniculatus*, *Trifolium minus*, *T. procumbens*, *Medicago lupulina*, and so on. With it in some places grew *T. agrarium*, which had apparently spread from little cultivated patches hard by. I hope local botanists will now look for *T. striatum* at Rhanbuoy.

Essays to verify some of Templeton's local records were not so successful. He noted *Epipactis palustris* "in a marshy field on the shore of Belfast Lough half a mile above Knockmagunny Hill," and *Trigonella ornithopodioides* "on a gravelly bank sloping to the sea at the north end of the Kinnegar at Holywood." The first is a widespread Central Plain plant, not seen in the north-east for over half a century; the latter a rare east-coast species of very local occurrence, excluded as casual in "Flora N.E. Ireland." For the first I searched the meadows from Sydenham to Holywood without success; but there is plenty of suitable ground there with abundance of *Orchis maculata* and *O. incarnata*—indeed, I never saw elsewhere such splendid profusion of the latter; and I shall not

be surprised if the Marsh Helleborine yet turns up. By way of consolation prize I got *Leontodon hirtus* in plenty from Tillysburn to the targets on the Kinnegar; it is very rare in the north. *Catabrosa aquatica* grew near the Kinnegar. This sand-spit still yields some of the plants recorded from it of old, such as *Gentiana campestris* and *Scleranthus*, but *Trigonella* was not seen. The north end of the Kinnegar is now much altered and built over.

The ancient district of Lecayll or Lecayle (*Leath Cathail*, Cathal's Half), now represented by the baronies of Upper and Lower Lecale, forms the south-eastern portion of County Down, and may be roughly defined as bounded by a line prolonging and joining the depressions which form the estuary of the Quoile and the Inner Bay of Dundrum; the boundary on the other three sides being the sea. Before the opening of the Killough and Ardglass branch railway in 1892 this was a district not easily accessible to botanists, and was the least known part of the well-worked county of Down. But even in 1888, the recording from this district in "Flora of the North-east of Ireland" of such local rarieties as *Erigeron acre* (only station in Ulster), *Juncus obtusiflorus* (only station in District XII.), and *Carlina vulgaris* (only station in Down) suggested that further work was required, and that this area might yield other species which, like these, here reach or approach their northern limit in eastern Ireland.

Since the opening of the railway many botanists have spent a day in this breezy country, and quite a number of good plants have been found in the district:—*Papaver hybridum*, *Leontodon hirtus* and *Eleocharis uniglumis* by Mr. Davies; *Erodium moschatum* and *Atriplex portulacoides* by Mr. Hanna; *Carlina vulgaris* and *Juncus obtusiflorus* by Mr. Waddell; *Crithmum maritimum* by Mr. R. Welch; and by myself *Papaver hybridum*, *Barbarea præcox*, *Agrimonia odorata*, *Carlina vulgaris*, *Carduus crispus*, *Vaccinium Oxycoccus*, *Cladium Mariscus* (two stations), *Carex limosa*, *C. filiformis*, *C. riparia*, *Poa nemoralis*, *Festuca rigida*.

In the course of a week spent at Killough, I had an opportunity of examining this district in a more leisurely manner than is afforded by a one-day trip. The surface being in general highly tilled, attention was directed to the two kinds

of ground where primitive conditions still prevail—namely, the sea-coast, which is extensive, and the marshes, which, though small, are numerous. The coast was examined from Ballykinler on Dundrum Bay to the entrance of Strangford Lough, and the marshes explored lay in almost every portion of the area already specified. The results proved unexpectedly interesting, and this in spite of the fact that Down is one of the best known counties in Ireland as regards its flora. In “Irish Topographical Botany” it ranks third in total number of plants, being passed by Antrim and Dublin alone; while in number of commoner plants absent, it and Antrim stand together at the minimum for all the Irish botanical divisions.

To take the coast-line first. The well-known sand-dunes and sandy fields of Ballykinler yielded, in addition to the already recorded flora, including *Carlina*, and fields grey with a one-foot-high crop of *Filago germanica* and *F. minima*, *Teesdalia nudicaulis* in profusion. I traced it over more than a mile of country, both north and south of the main road, from near the “corn mill” of the O. S. map eastward to near Tyrella. It does not grow on the unreclaimed dunes, nor yet in the tilled fields among weeds of cultivation; but in ground that has gone out of cultivation, the chosen home of the two *Filagos*, *Erodium cicutarium* and *E. maritimum*, *Viola Curtisii*, *Lepidium Smithii*, *Endymion*, *Pteris*, *Rumex Acetosella*, it grows in abundance amid a flora none of whose members are relics of former crops, but have spread into the unoccupied area from wild ground adjoining. When to this evidence is added that which we already have concerning the Lough Neagh and Killarney stations of the plant, I doubt if its claim for admission to the indigenous Irish flora can be longer resisted. I fancy it will turn out to be, like *Limosella*, an inconspicuous native that has been overlooked.

By the shore near Craigalea I met for the first time during my visit *Juncus obtusiflorus*, a plant of which I was destined to see much. On bare wet sands at the same place a very peculiar grass grew in close prostrate spreading patches, deeply rooting at every node. Mr. A. Bennett tells me it is *Catabrosa aquatica* var. *littoralis* Parnell = var. *minor* Bab. This variety has not been recorded from Ireland hitherto. *Glaucium flavum* is represented in the records, in the wide gap between

its Mourne and Ards stations, by a single plant gathered by Corry in Killough Bay. I found it tolerably abundant below Minerstown, and extending sparingly to Ringsallin on one side and Rossglass on the other. A rarer local species is *Mertensia maritima*. Excepting its Mourne stations, the only Down records are, near Dundrum (1799) and at Rathmullan (1810), John Templeton; and a single plant at Rathmullan (1878), T. H. Corry. I found it first at Rossglass Point below Janeville—a good colony—and traced it thence westward, sometimes in considerable abundance, to Rathmullan Point, a distance of nearly three miles, the station of Templeton and Corry forming its extreme western limit. The road runs mainly along the beach here, sometimes without any fence, so that this rare and shy plant may actually be described as flourishing by the roadside. About Minerstown *Echium* is a sight to see, fringing the fields, and in some cases filling them, with a blaze of vivid blue. From Minerstown westward *Atriplex farinosa* occurs frequently, and at Benderg. *Raphanus maritimus*, also very rare locally (see p. 209), was seen sparingly at Rossglass Chapel and at Murphystown. *Atriplex portulacoides* was found at the head of Carlingford Lough by Mr. Stewart in 1882, which remained the only Ulster station till Mr. R. Hanna found it at the Inner Bay of Dundrum in 1894. My rambles extended its range further northward, in three stations successively, as far as Guns Island. An important find was *Orchis pyramidalis*. This was known from Down only through two plants seen at Ballyholme in 1873 by Mr. Stewart, which were set down as casual in “Flora N. E. Ireland,” and the plant excluded; I reinstated it for Down in “Irish Top. Bot.,” believing it to be native there. My wife spotted it from the car growing on a bank over the road east of Murphystown. It is here extremely rare—two specimens only were seen, just as at Ballyholme—but later the same valuable ally drew my attention to a young plant on which I had almost put my foot west of Killard Point. Searching here, we discovered it in abundance along the slopes over the sea for a considerable distance, extending as far west as the coastguard boathouse. *Habenaria viridis*, rare in Down, grew with it sparingly. *Thalictrum dunense* was also extended northward in Down. At Rathmullan it grew by the roadside, and also by the beach, where

it formed dense groves three feet in height; and later it was seen in Benderg Bay in plenty.

From St. John's Point northward to Ballyhornan the coast is very rocky, the rocks generally low, occasionally precipitous. This ground proved as productive as the sands. *Crithmum* has been recently added to the North-eastern flora by the discovery of three stations in Down, one of which lies in this district—St. John's Point. The plant proved to be frequent, but local. It usually grows on this coast sparingly and stunted on the low, lichen-covered rocks, and is not easy to see; but I found it in seven stations altogether, from the recorded one northward to the north side of Ardglass Harbour. It no doubt extends further; but rock-jumping along these Silurian knife-edges is trying for more than the boots, and palls by degrees. A rarer plant which grew in similar situations was *Artemisia maritima*, not previously recorded from Ulster. It was found covering the north face of a large rock—the other side of which was covered with *Crithmum*—a quarter mile north of Dog's Rock. Subsequently my wife found it at Corbet Head, where it grew so stunted among grey lichens in the chinks of the rocks as to be almost impossible to find. Dundalk was its previous most northern station in Ireland. Another welcome addition to the North-eastern flora was *Statice occidentalis*. There is abundance of it on the bold headland between Legnaboe and Portnacoo. As previously remarked, Clogher Head in Louth was its most northerly east coast station hitherto. But the finds that interested me most were some of the clovers that I had lately sought elsewhere. *Trifolium striatum* first turned up on the gravelly spit by the breakwater on Coney Island, just opposite Killough pier, and with it was the plant I had sought vainly at Clogher Head and Holywood—*Trigonella*. Both were remarkably luxuriant here. Some of the plants of *T. striatum* covered a circle three feet in diameter, and *Trigonella*, represented on Howth by tiny specimens the size of half-a-crown, here formed plants measuring a foot or more across. The cold, wet June was no doubt accountable for this. A few hours later I found *T. striatum* again, on a boss of rock below Ardglass Presbyterian Church. With it, in this instance, grew *T. filiforme*, another desideratum of the North-eastern flora. This plant was

also of unusual robustness, some of the specimens spreading among the low herbage, forming patches a foot across. A short distance away to the northward was a second patch of *Trigonella*, like the first patch small in quantity and luxuriant in growth. *T. striatum* was then found covering in immense abundance almost every rock on the north side of Ardglass Harbour; subsequently in quantity from Portnacoo to Ballyhornan village, and finally in several places from Janeville to Rossglass chapel. *Trigonella* I was glad to find for a third time on a boss of rock on the north side of Sheepland Harbour, a lonely little rocky bay. On this coast *T. striatum* and its companions are particularly partial to low glaciated bosses of rock, where they grow among *Thymus*, *Anthyllis*, *Scilla verna*, *Trifolium minus*, and *Medicago lupulina*.

Near Killough Station the Railway Company has excavated a large portion of the raised beach for ballast, and a number of the rarer local plants have invaded the bare ground thus formed. Here grow all four Poppies—*Rhæas*, *dubium*, *Argemone*, *hybridum*; *Leontodon hirtus*, *Festuca rigida*. Towards Coney Island all four Poppies were seen in greater abundance than they may be found anywhere else in the North-east, *P. hybridum* being particularly common. All have been recorded from this neighbourhood, except *P. Argemone*, previously known only from the extreme north of the county; but it proved to be not rare in this district.

The brackish Strand Lough near by yielded great groves of *Carex riparia*, and in drains by the railway such plants as *Eleocharis uniglumis*, *Scirpus pauciflorus*, and *S. rufus*, and *Potamogeton flabellatus*, the last not previously recorded from the North-east, and having, indeed, only one previous station in Ulster.

Lastly, as to the marshes. I anticipated good results here, so marked in on the 1-inch map, from off the 6-inch, the positions of twenty or thirty marshy bits. With the assistance of a bicycle and a pair of old boots, I visited and waded them all. Wherever a felt of creeping plants formed a skin over the mud and water below—as it did in the majority of cases—this felt was found to consist mainly, sometimes almost exclusively, of *Juncus obtusiflorus*, *Carex teretiuscula*, and *C. filiformis*, plants which were reckoned as among the very rarest in County

Down, the first having two recorded stations, the others only one each. I saw all in at least twenty marshes over the whole district, from Dundrum to Strangford, and from St. John's Point to Downpatrick, and usually in enormous profusion. In one place, near Tyrella Chapel, several acres of *C. filiformis* were being mown as a crop! Presumably for bedding. The marshes yielded some other excellent plants. Abundance of the pretty *Stellaria palustris* was the reward of wading the *Phragmites*-filled marshes that surround the little Lough Keelan; hitherto unknown in Ulster off the Carboniferous limestone area in Fermanagh and Cavan. The pools in the extensive marsh at Rathmullan were filled with *Chara polyacantha* (in Ulster recorded only from the limestone in Armagh and Monaghan), and with *Potamogeton plantagineus*, another characteristic Central Plain species, and unrecorded from Ulster. This pondweed was found also in boggy drains in marshes N.W. of Ballymenagh House, and at Tobermoney—a curious abnormal starved form, of which Mr. Bennett writes that the specimens are very like the original ones of *P. helodes* Dum., which is a synonym of *P. plantagineus*, and that they are not one third the size of Yorkshire specimens he has.

The occurrence in this slate district of several of the plants mentioned—*Stellaria palustris*, *Orchis pyramidalis*, *Juncus obtusiflorus*, *Potamogeton plantagineus*, *Chara polyacantha*, which are calcicole in their soil relations and "Central" in their Irish distribution, and with the exception of the second unknown elsewhere in the North-east, is interesting. I believe the clue to the matter is to be found in the fact that the pre-glacial entrance of Strangford Lough is supposed to have been situated here; during the Ice Age great quantities of limestone were strewn over this district, derived from the Castle Espie area; numbers of these erratics may still be seen everywhere, and the amount of lime that has been dissolved may be gathered from the massive "calcreted" gravels at Benderg, Killough, and elsewhere in the neighbourhood. So that it would seem that the drift supplies sufficient lime for this group of plants, while the solid geology shows no trace of limestone.

Two species, *Carex limosa* and *Vaccinium Oxycoccus*, which I recorded from a little marsh at Saul Camp some years ago,

were not seen anywhere else, and I revisited the spot to see what was the difference between this marsh and others. I found that its vegetation included much *Sphagnum*, with *Juncus acutiflorus*, *Calluna*, *Carex curta*, *Eriophorum vaginatum*, and mosses, with plenty of the two rare plants already referred to. This place is, in fact, a scrap of wet bog instead of marsh, all the species named being common bog plants, and absent from the marshes of the district.

Poa nemoralis is a plant with a peculiar history in the North-east. It was found in all three counties by the older botanists—Templeton, White, Moore; then lost sight of for half a century or more; and recently refound in several stations in both Down and Antrim, chiefly by Mr. Waddell. Last Christmas I noticed it at Craigdarragh and a few miles away at Clandeboye, unmistakable even in its winter state, but regathered it in flower last July to make sure. In Lecale I have already recorded it from Myra Castle, and during the present trip it turned up at Ardglass. It may probably be correctly set down as frequent in Down.

From the point of view of additions to the indigenous flora of the divisions of Ireland, the Lecale plants mentioned in these notes range as follows:—

NEW TO ULSTER.

Trigonella ornithopodioides.	Potamogeton plantagineus.
Artemisia maritima.	

NEW TO DISTRICT XII.

Teesdalia nudicaulis.	Statice occidentalis.
Stellaria palustris.	Potamogeton flabellatus.
Trifolium filiforme.	Chara polyacantha.

NEW TO COUNTY DOWN.

Trifolium striatum,	Carex stricta.
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It may be convenient to condense these Lecale notes into systematic form:—

Thalictrum dunense, Dum.—Rathmullan, and north end of Benderg Bay.

Ranunculus Lingua, L.—Rathmullan marsh.

Papaver Argemone, L.—About Tyrella, Rathmullan, and the north side of Killough Harbour.

P. hybridum, L.—Minerstown, Rathmullan, and Tyrella.

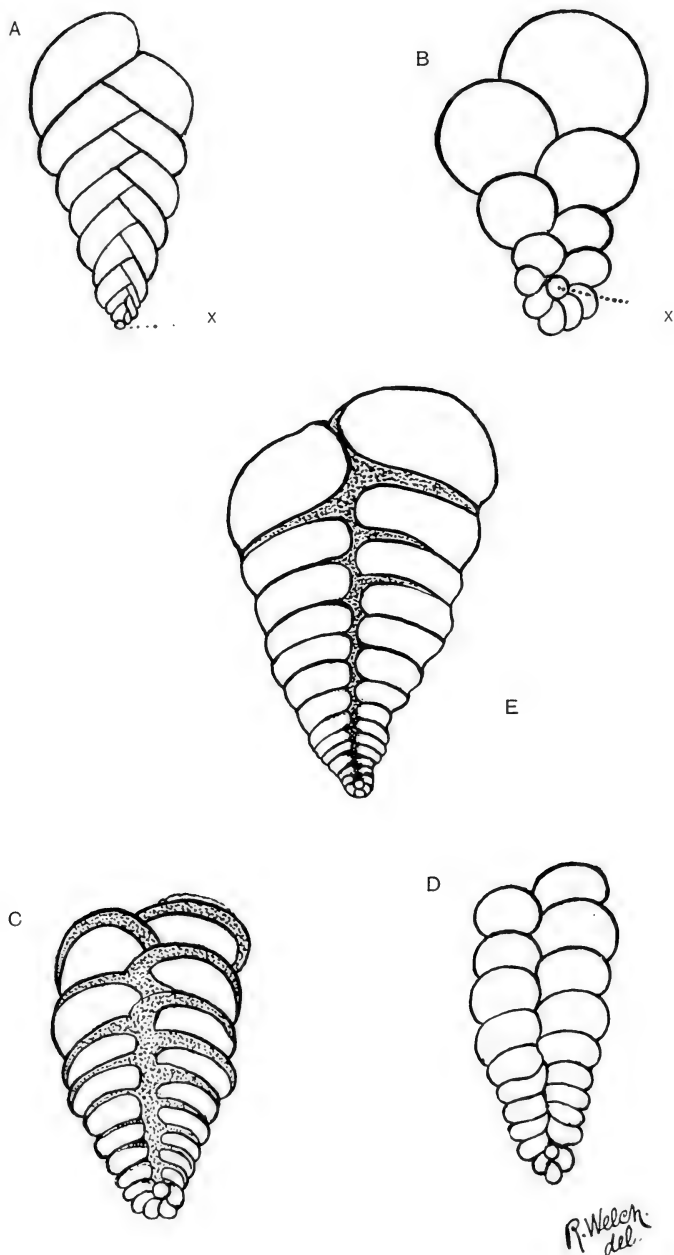
Glaucium flavum, Crantz.—At intervals from Tyrella to Rossglass.

- Brassica alba**, Boiss.—Rossglass, Killough, Ballyhornan; in the first station in great abundance.
- Teesdalia nudicaulis**, R. Br.—Abundant in sandy fields at Ballykinler.
- Raphanus maritimus**, Sm.—Sparingly at Rossglass chapel and Murphystown. Mr. Stewart's record, "Plentiful from Killough to St. John's Point, 1893" (*J. N.*, iii., 36, 1894, and *Suppl. Fl. N.E.I.*), refers to a maritime form of *R. Raphanistrum*, and is, with his authority, withdrawn.
- Viola canina**, L.—Here and there abundant on rocky as well as sandy shores.
- Stellaria palustris**, Retz.—Lough Keelan, plentiful.
- Hypericum elodes**, L.—Marsh two miles east of Dundrum.
- Erodium moschatum**, L'Hérit.—Coney Island.
- ***Medicago maculata**, Sibth.—A flourishing colony on waste ground near the old pier at Ardglass.
- Trigonella ornithopodioides**, DC.—Coney Island, Ardglass, Sheepland Harbour.
- ***Trifolium agrarium**, L.—Frequently sown with grass-seed in this district, along with *T. hybridum*, &c., but so far appears confined to cultivated land.
- T. striatum**, L.—Abundant at intervals along the coast from Rossglass to Ballyhornan, a distance of about ten miles.
- T. filiforme**, L.—Ardglass, with *T. striatum*.
- Crithmum maritimum**, L.—Frequent on the coast from St. John's Point to Phennick Point.
- Artemisia maritima**, L.—On the shore at Corbet Head, and more abundantly half a mile southward of that spot.
- [**Centaurea Scabiosa**, L.—In a field of wheat east of Tyrella.]
- Carduus crispus**, L.—Sparingly at Rossglass.
- Leontodon hirtus**, L.—Around the Strand Lough at Killough.
- Statice occidentalis**, Lloyd.—Abundant on the headland north of Leguaboe.
- Mertensia maritima**, S. F. Gray.—Rossglass Point to Rathmullan Point.
- Lamium hybridum**, Vill.—Ballykinler, Rossglass, Killough.
- Atriplex portulacoides**, L.—Rossglass, Killough, and opposite Guns Island.
- A. farinosa**, Dum.—Benderg, and frequent Minerstown to Dundrum.
- Orchis pyramidalis**, L.—East of Murphystown, and between Killard Point and Mill Quarter Bay.
- Habenaria viridis**, R. Br.—West of Killard Point.
- Juncus obtusiflorus**, Ehrh.—Frequent on the coast, and abundant in marshes throughout the district.
- Sparganium minimum**, Fr.—Marsh near Ballymenagh House.
- Potamogeton plantagineus**, Duer.—Common in pools in Rathmullan marsh; near Ballymenagh House and Tobermoney.
- P. flabellatus**, Bab.—Drains by the Strand Lough at Killough.

- Cladium Mariscus**, R. Br.—Marsh north-east of Churchtown.
- Scirpus pauciflorus**, Lightf.—Common in marshy ground throughout the district.
- S. rufus**, Schrad.—Killough, Ballyhornan, Killard.
- Eleocharis uniglumis**, Link.—Strand Lough at Killough.
- Carex paniculata**, L.—Churchtown, Tobermoney, Bright, Ballee; in the last-mentioned station some of its stools were four feet in height, giving the plant the appearance of a tree-fern or screw-pine.
- C. teretiuscula**, Good.—} In immense abundance in marshes
C. filliformis, L.—} throughout the district.
- C. stricta**, Good.—Marsh two miles east of Dundrum.
- C. riparia**, Curt.—In great groves beside the Strand Lough at Killough.
- Poa nemoralis**, L.—Grounds of King's Castle at Ardglass.
- Catabrosa aquatica**, L. var. **littoralis** Parnell—Sandy shore below Tyrella.
- Bromus sterilis**, L.—Ballynoe, Killough, Rossglass, Tyrella.
- Lepturus filliformis**, Trin.—Killough.
- Asplenium marinum**, L.—One clump north of Ardglass.
- Chara polyacantha**, Braun.—Plentiful in pools in Rathmullan marsh.

The following local plants are frequent in the district:—*Sium angustifolium*, *Valerianella dentata*, *Linaria vulgaris*, *Utricularia vulgaris*, *U. minor*, *Lamium intermedium* and *L. amplexicaule*, *Stachys arvensis*, *Rumex Hydrolapathum*, *Scleranthus annuus*, *Catabrosa aquatica*. Along the coast, *Cenante Lachenalii*, *Beta maritima*, *Polygonum Raii*, and *Kæleria cristata* occur wherever the ground is suitable. The following, seen within the district, hardly deserve separate mention:—*Prunus Cerasus*, *Rosa rubiginosa*, *Euphorbia exigua*, *Salix pentandra*, *Equisetum sylvaticum*. Of the rare plants previously found in the district, mentioned on p. 202, all were seen in their recorded stations except *Erodium moschatum*, *Barbarea præcox*, *Agrimonia odorata*, *Carduus crispus*, *Poa nemoralis*; but no effort was made to verify any of these.

It may seem remarkable that the short period of seven days should in a limited area add nine species to the well-worked flora of the North-east; but the Lecale district was a promising one, and its best portions had not hitherto been properly examined; its rocks had never been climbed, nor its marshes waded.



FORAMINIFERA.

TEXTULARIA AND SPIROPLECTA, SHOWING MODE OF GROWTH.

[To face p. 211.]

SOME FORAMINIFERA FROM RATHLIN ISLAND.

BY JOSEPH WRIGHT, F.G.S.

PLATE 3.

DURING several visits to Ballycastle in recent years Messrs. Chaster, Hardy, Standen, and Welch spent some time dredging in Rathlin Sound and Church Bay. As the dredgings were undertaken with the view of collecting shells only, the sieves which were used for the washing of the material were those best fitted for that purpose, and were not fine enough for retaining organisms so small as Foraminifera. The specimens found by me in the material consisted for the greater part of the larger forms, and in all probability nearly all the smaller ones got washed away with the fine material; this no doubt is the reason why a number of species usually met with around the Irish coasts were not found in these gatherings.

One of the most interesting forms met with was *Botellina labyrinthica*. This species had some years previously been found in considerable abundance in a dredging taken about midway between Belfast Lough and Portpatrick, at a depth of 100 fathoms (¹); the only previous record for this fine species being the Faroe Channel, where it was obtained in some abundance on the third cruise of the "Porcupine," 1869, at a depth of 440 fathoms (²). It may be here also stated that a very small but perfect specimen of *Fron dicularia Millettii* was obtained many years ago in a dredging taken off Portrush. Both of these species are now recorded as new to the British fauna.

In my report of the Foraminifera of the South-West of Ireland during the cruise of the "Flying Falcon," 1888 (³), I recorded *Textularia sagittula*, Defrance, under the name of *Spiroplecta sagittula*. On this occasion the specimens were examined under the microscope with reflected light only, and

(¹) Second dredging cruise ss. "Protector," Belfast Nat. Field Club, 1886.

(²) Brady. "Challenger" Report, p. 280.

(³) *Proc. Roy. Irish Acad.*, 1891.

as the test of this species is subarenaceous, the spiral arrangement of the early chambers, which constitutes the difference between *Spiroplecta* and *Textularia*, is not easily seen. This is especially the case with the pointed forms, in which the early spiral chambers are always extremely minute. I have since examined with transmitted light specimens mounted in Canada balsam, and by this means I have been enabled to see most distinctly the arrangement of the chambers throughout the entire test. I have examined in this way about 150 from dredgings taken off the Irish coast, including these Rathlin specimens, with a large number of fossil specimens from the Chalk of Co. Antrim; also the only perfect specimen which I had of the variety *fistulosa*, Brady, from Raine Island, Torres Straits, 155 fathoms. In all cases both the recent and fossil specimens when perfect had the early chambers arranged in a spiral manner. Further research since 1888 has therefore confirmed me in my belief that this species is truly a *Spiroplecta* and not a *Textularia*.

To my friend, Robert Welch, I am greatly indebted for the very accurate drawings of the Foraminifera which accompany this communication.

The following species were from dredgings taken in Church Bay in from 17 to 22 fathoms:—

LIST OF SPECIES.

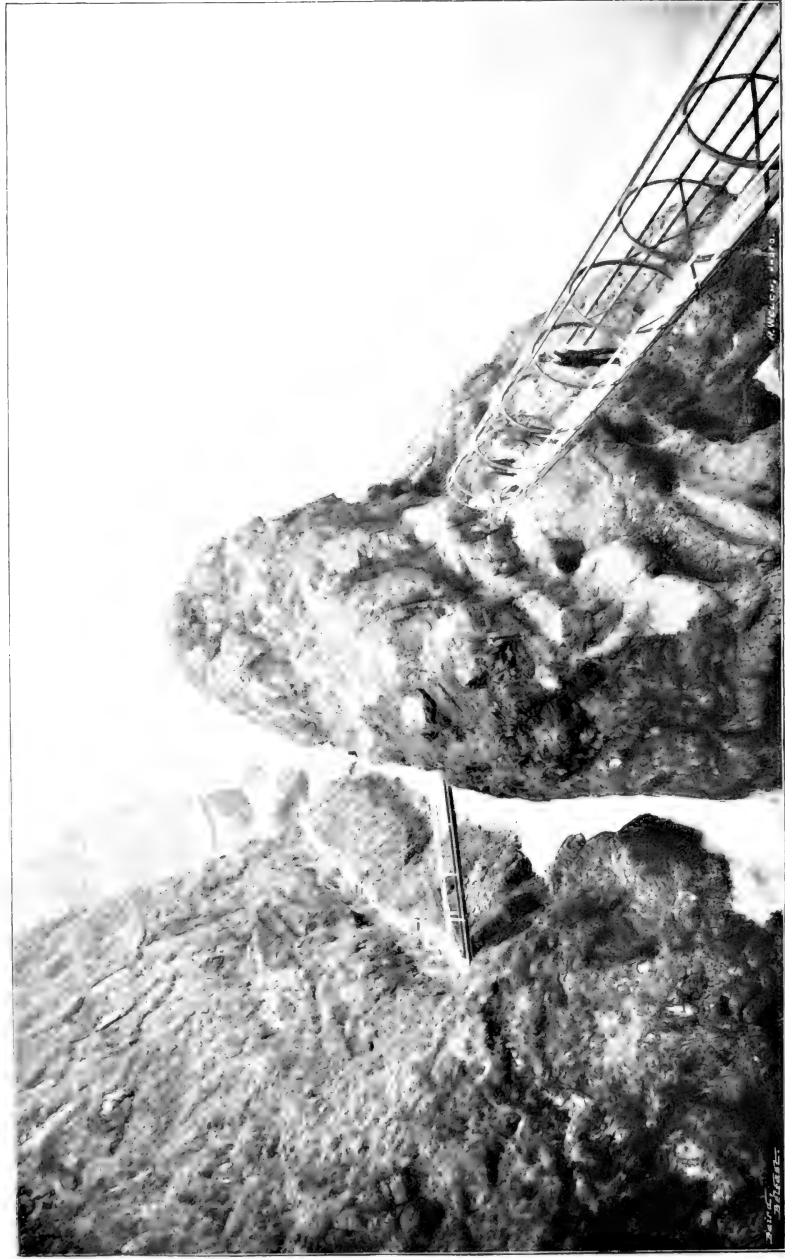
- Elloculina irregularis**, d'Orb.—Very rare.
B. ringens, var. **elongata**, d'Orb.—Rare.
B. depressa, d'Orb.—Frequent.
Spiroloculina excavata, d'Orb.—Frequent.
S. canaliculata, d'Orb.—Rare.
Miliolina seminulum (Linn.).—Common.
M. oblonga (Montag.).—Very rare.
M. trigonula (Lamk.).—Rare.
M. secans (d'Orb.).—Rare.
M. subrotunda (Montag.).—Rare.
M. bicornis (W. & J.).—Frequent.
M. Ferussacii (d'Orb.).—Rare.
M. agglutinans (d'Orb.).—Very rare.
Jaculella acuta, Br.—Frequent.
Hyperammina arborescens (Norm.).—Rare.
Botellina labyrinthica, Br.—Common.
Reophax scorpiurus, Montf.—Very rare.
R. moniliforme, Siddall.—Rare, specimens large.

THE GOBBINS CLIFFS AND CAVES, CO. ANTRIM.

BY R. J. WELCH.

PLATE 4.

NATURALISTS have often deplored the fact that these fine mural precipices, some miles long, facing the open channel on the east coast of Islandmagee, were quite inaccessible from below, rising as they do in many places sheer out of deep water. Sea gullies cut across the narrow ledges into the caves at other parts, and some of these could not be passed even in calm weather. All this is now changed thanks to the enterprise of the Northern Counties Railway Company, whose engineer, Mr. Wise, has been for months past cutting a path out of both the solid and more friable amygdaloidal basalts along the base of the cliffs, right in the cliff face at some places and through projecting spurs at others. He is making a special effort to have all the ravines on the second section of the path bridged before the British Association meeting in Belfast. Many of the steel girder bridges were lifted with much difficulty from rafts towed from Whitehead, and the 70-foot oval hollow lattice girder, through which the path is carried over the deep ravine at the Man-o'-War sea stack, was lately towed without mishap to the stack, and successfully hoisted up the cliff face into position. The stack is a fine example of the results of marine erosion, the shape determined by the rough, vertical jointing of the harder lava flows, and a dyke which has weathered out rapidly parallel to the main cliff face. There are many other examples of a different nature now easily examined, close to or on the path itself. Some soft vesicular basalts have honeycombed, and weathered all colours, in the most fantastic way, partly from marine, partly through atmospheric agencies. During the progress of the work a cave was re-discovered which has been hidden by a great fall of rock for over 40 years. This was blasted away, and between 400 and 500 tons of cliff *débris* and rolled sea boulders partly filling the cave removed. Under this were many bones of mammals (including Red Deer horns), birds, and fishes, especially at the sides of the cave, regularly cemented to the boulders by calcareous deposits brought down by percolating waters. These latter have



THE GOBBINS BASALTIC CLIFFS, ISLANDMAGEE.

NEW CLIFF PATH AND MAN O' WAR SEA-STACK.

[To face p. 215.]

also formed on the upper part of this cave small but very pretty stalactites of an unusual form, like a branching coral. With the bones in some hollows in the lowest part of the cave reached, and far from the mouth, were land shells; these may, however, have been washed in through the *débris* at the mouth during heavy rains. Other caves partly filled at the mouth have also been cleared. Some have fine clusters of the Sea Spleenwort, *Asplenium marinum*, fortunately far removed above danger from the fern hunter, and a 7-foot iron railing has been erected in the Sandy Cave to protect the beautiful fern growth on one side. Some caves still remain unexplored.

There are many rock pools for the marine zoologist, some coated with the pretty pink *Lithothamnion*, and "nature's drills" may be seen in pot holes, drilled deep in the amygdaloids by harder basalt boulders. Geologists will find all along the path, material quarried ready to hand, and are particularly requested not to damage the natural rock surfaces close to it.

The fine Cretaceous sections near Port Muck are not far from the third section of the path, which will cross the mouths of six of the "Seven Sisters" caves by a suspension bridge 250 feet long, and will have to be tunnelled inwards along a dangerous part of the cliff; this may prevent the completion of this portion this season to Heddle's Port. The Herring Gulls nest very thickly on the cliff ledges, where the softer basalts have weathered out, above this section, and a few built right down on the path itself, though blasting was going on regularly. Seals have been noticed on the rocks almost every day in early August, and Porpoises were rolling about close in on the last day I was there.

The first section was almost finished last season; it runs by the sea margin along the picturesque undercliff, where the Chalk and basalt have broken up and slipped over the Lias clay. These unstable areas form undulating green slopes with a dense vegetation in the hollows, alternating with rock masses and water channels quite different from the cliff section. The botanist and entomologist will find much to interest them here. Good outcrops will be found all along this undercliff, especially at Cloughfin Harbour and near Hill's Port, of Chalk with sponge remains, Chloritic Chalk,

Yellow Sandstones, Marls, and Glauconitic Sands. Some of these are very fossiliferous, and details of them will be found clearly given in Dr. Hume's "Cretaceous Strata of Antrim" *Q. J. G. Soc.*, Nov. 1897, pp. 557-560, Pls. xlv. and xlv. The basalts of the Gobbins have not received the attention they deserve; this may now be altered in the near future, but a brief account of them with section at southern end will be found in the Geological Survey Memoir to Sheet 29.

Belfast.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Persian Lioness from H.M. the King, a pair of Badgers from Mr. F. Knee, three Turnstones from Mr. R. Warren, a Rhesus Monkey from Mrs. M. de Burgh, Monkeys from Mr. Alcock and Mr. Mangan, two Sparrow-hawks from Mr. J. E. Faris, a Corn-crake from Mr. L. F. Perrin, a Parrot from Miss Tighe, a Gannet from Mr. R. S. Chatterton; also a Sykes Monkey, two Radiated Tortoises, nineteen Doves, and thirty-four small foreign birds from Mr. J. Ff. Darling. The most important acquisition to the Gardens for many years past is a young Giraffe given by Butler Bey, of El Obeid. No live example of the species has been seen in Dublin for many years, and it is satisfactory to record that the animal has borne well its tedious journey from the Soudan, and is attracting many visitors to the Gardens.

A Barbary Lamb, two golden Agoutis, and seven young Boars have been born in the Gardens.

BELFAST AND DUBLIN NATURALISTS' FIELD CLUBS.

JULY 11-14. EXCURSION TO LOUGH ERNE.—On the morning of the 11th the Belfast members assembled at the Great Northern Terminus in time to take the 9.40 train. At Clones the Dublin Field Club joined the party, and the combined party proceeded to Newtownbutler. Alighting here, cars were taken for Crom Castle. The Earl of Erne extended the greatest courtesy to the party in granting permission to visit the grounds and in arranging with his chaplain, Rev. J. H. Steele, to conduct. The party spent some time botanising in the neighbourhood. Orchids were found in great variety. The great Yew tree at Crom came in for

attention from the photographers. At Crom Castle an Alder was noticed, the leaves of which were completely covered with the warty excrescences of a gall mite, probably *Phytoptus levis*, Nalepa; the whole tree was affected. The Water Valerian was common, with great masses of Meadowsweet and Purple Loosestrife.

Proceeding to Crom Pier, the party embarked on the s.s. Belturbet, kindly placed at the disposal of the party by Miss Porter, of Belleisle, a member of the Dublin Club. An hour's steaming down the lake brought the Clubs to Knockninny Hill. Here the party landed to allow time for collecting. Some of the more energetic climbed Knockninny Hill. On the summit Mr. Thomas Plunkett, M.R.I.A., of Enniskillen, was awaiting the party, having been engaged all morning directing operations of excavating the cairn in the expectation of having an exhibit of antiquities *in situ* for the benefit of the Club. Though expectations were not realised in this respect much was found to discuss.

Tea awaited the party at Knockninny Hotel, charmingly situated near the shores of the lough. A two hours' run by steamer through charming scenery, past old castles and monasteries, gave the party time to admire such finely-wooded demesnes as Belleisle.

Arriving at Enniskillen, the party proceeded to their headquarters, the Royal Hotel. Owing to the numbers on the excursion a section had to be accommodated at the Imperial.

Owing to inclement weather on the morning of the second day, it was decided to postpone the hour of starting announced on the programme. The interval, however, allowed the party to visit the public park, and those who braved the elements were well rewarded.

A short interval of fair weather favoured a start at ten o'clock on the s.s. Widgeon for the lower lough. The scenery on each side of the river was much admired.

The round tower of Devenish soon came into view, and a stop was made to allow a landing on the island. The principal objects were seen and photographed—the Ancient Celtic church, the round tower, St. Mary's Abbey, and the high cross. Mr. Edward Archdale met the party on the pier at Castle Archdale. The party were hospitably entertained to lunch by Mr. Archdale, and afterwards boats were placed at the disposal of the party to visit White Island and Davy's Island, or for dredging. One section, however, preferred to roam about the well-kept grounds and gardens. The botanists found much to note, among which the following may be mentioned:—*Epipactis latifolia*, *Listera ovata*, *Neottia Nidus-avis*. Among the Lepidoptera the following were noted:—*Plusia bractea* and *Acentropus niveus*. The rare Amber shell *Succinea oblonga* was collected on Davy's Island, one of the three lately discovered stations for it in the district. The eighth-century church on White Island was visited, and the sheela-na-gig carvings photographed. The return sail to Enniskillen was made under a heavy downpour of rain.

The programme provided no official excursion for the third day. A few members went out to Monea, where dwellings representative of three periods of history were found in proximity. The mansion of

Monea, situated on an eminence and enclosed by a well-wooded park, represents the modern period. The castle of Monea represents the life of mediæval times. Close to the castle is the crannoge, representing the life of pre-historic times. A clump of trees surrounded by rushes in the centre of a quiet lake is all that is now visible of this early dwelling. The shaft of a sculptured stone cross in the Boho Churchyard was inspected. The cave in the limestone tempted many to explore its mysteries, to hunt for bats, or wander far into the dark underground passages. Mr. Plunkett had thoughtfully provided afternoon tea on the lawn near the police barracks. Afterwards a second cave was explored and illuminated brilliantly, and the party returned in the evening to Enniskillen.

The fourth day found the party astir at an early hour, and at 8.30 the whistle signalled the start of the cars. The destination was the Marble Arch. Arrived there, a walk of about a mile up a beautiful glen, and the party got on to the open mountain, and, under the guidance of Mr. Plunkett, soon found themselves above a deep glen. At the bottom of this was found a small opening, through which the party made a descent over rugged rocks. A short journey by narrow underground byways led to a rapid underground river. Torches and flares were lit, and a cavern of considerable dimensions was discovered, in places at least thirty feet high. The drive home was accomplished in quick time, and the whole party left Enniskillen by the afternoon train.

BELFAST NATURALISTS' FIELD CLUB.

JUNE 28. EXCURSION TO NEWRY.—The Club visited Newry on this date. The greater part of the day was devoted to an inspection of the fine collection of alpine and herbaceous plants, ferns, &c., in the Daisy Hill Nursery of Mr. T. Smith. Afterwards the Crown Fort was visited.

NOTES.

BOTANY.

***Carex teretiuscula* near Lisburn.**

Rare in the north-east, this plant was found in July last, in a sedgy, mossy bog in a field where the road from Lambeg joins that from Lisburn to Derriaghy, Co. Antrim. There is, however, not much of it, and the specimens gathered, though characteristic, were small. Last year it was seen, in almost unthinkable quantity, in a deep bog by the Co. Down side of the river Lagan, about a mile above Lisburn.

J. H. DAVIES,

Lisburn.

Poa nemoralis near Lisburn.

This slender and graceful *Poa* grows abundantly in sandy soil, under beech trees on a bank by the Dublin road, about half a mile from Lisburn, County Antrim. Though accepted as native, it appears likely that it may not be so in some of the places from which it has been reported. In a Belfast seed-list I have seen its name advertised as that of a grass recommended for growing in shrubberies! In the present locality it has been noticed for the last three or four seasons, and that it is truly native there I think there cannot be any reasonable doubt.

J. H. DAVIES.

Lisburn.

Brachypodium pinnatum, Beauv., in Co. Cork.

On August 7th last, while on a visit to Courtmacsherry, I found this handsome grass growing abundantly along the edge of the cliffs in that neighbourhood. This is its second known station in Ireland, and represents a considerable extension of range, the other locality being near Tramore, Co. Waterford, where I discovered it in 1898. It is undoubtedly native in both localities.

R. A. PHILLIPS.

Cork.

Botanical Exchange Club.

We have received the Report for 1901 of the Botanical Exchange Club of the British Isles, which contains, as usual, notices of a few Irish species. A departure is made in the reproduction (from the *Memoirs* of the Manchester Lit. and Phil. Soc., vol. XLVI., No. 1, pp. 1-8), of two excellent photographs of *Diotis candidissima* growing at Lady's Island Lake, Co. Wexford. In the publication last-mentioned these photographs illustrate a paper by Mr. Cecil P. Hurst on the "Range of *Diotis candidissima* Desf., in England and Wales, and in Ireland," to which we are glad to draw attention.

Irish Plant Records.

In the *Proceedings* of the Royal Irish Academy, vol. XXIV., Section B, No. 2, Mr. Praeger publishes a paper "Gleanings in Irish Topographical Botany," consisting mainly of notes of varieties, hybrids, and aliens, made in connection with the field-work carried out for "Irish Topographical Botany." The distribution in Ireland of various critical groups is here given for the first time—*Euphrasia*, for instance, to the extent of over 150 records, and *Rosa canina*. The *Characeæ*, also, and *Alchemilla vulgaris*, are treated in great detail. The paper contains new records for some rare or unrecorded plants, such as *Nasturtium barbarædes*, *Cerastium triviale* var. *holosteoides*, *Stellaria umbrosa*, *Rhinanthus stenophyllus*, Schur., *Juncus diffusus*, *Potamogeton Bennettii* (one other British station), and various hybrids of *Rubus*, *Salix*, &c.

ZOOLOGY.**Vespa austriaca.**

Males of *Vespa austriaca* have been about in considerable numbers. I took a dozen in a short space of time, and could have taken as many more. If any reader of the *Irish Naturalist* would care for specimens of this rare male I shall be happy to send them, so far as my supply goes, on receipt of a suitable box for packing.

DENIS R. PACK-BERESFORD.

Fenagh House, Bagenalstown.

Lacerta vivipara.

Some years since I was asked whether I had ever seen green specimens of the Common Lizard in Ireland. I mentioned that I had taken one of brilliant green in Killarney, which is now in the Museum, though of course its colour may have faded in alcohol. I now write to record another seen at Fort Carlisle, one of the two fortified headlands that dominate Queenstown Harbour, Co. Cork.

W. F. DE V. KANE.

Monaghan.

Sea Eagle and Golden Eagle in Donegal.

While passing through Dunfanaghy in N.E. Donegal, on 5th August, I made inquiry whether Eagles were still to be found about Horn Head, and found a young man (Strain), a practised cliff climber (his father climbed the cliffs for eggs for many years), and had a good talk with him. He seemed to have a thorough knowledge of the local birds. He told me that a pair of Sea Eagles had frequented the Horn for a month or two last winter, and that during the past ten years or so he had seen the Eagles occasionally—it might be every third or fourth year—and always in the late autumn or winter. He also told me that he had seen a Golden Eagle at Glen Veagh last spring, which he believed was nesting.

He reported that a pair of Ravens had built and brought out their brood on Horn Head this year.

D. C. CAMPBELL.

Londonderry.

Wild Swans in Donegal and Antrim.

On July 25th my land steward at Kilderry, Co. Donegal, saw twelve wild swans flying overhead in a N.E. to S.W. direction. On 28th, being at Portrush, Co. Antrim, a party of five of us saw nine swans coming in also from N.E. to S.W. They were flying at no great elevation, and passed within about two gunshots, or rather less, of the rocks at the Blue

Pool, where we were standing, and flew over the town towards Castle-rock, after which we lost sight of them. The hour was between 1 and 1.30 p.m. Is it not unusual for swans to come south at this season? My land steward tells me that since I wrote to you in April (*J.N.*, p. 151), another brood of five young Woodcocks was found here.

W. E. HART

Kilderry, Co. Donegal.

Nemesis !

In June last I took a clutch of eggs which proved to be far advanced in incubation. Consequently I had to macerate them, so after blowing in as much water as possible, I put them in a small cardboard box, and left the box on a shelf in the summerhouse in my garden. I was away for six days, and on my return was surprised and pleased (?) to find that a pair of Spotted Flycatchers had built a nest on the top of the eggs in the box, and one egg was laid! I did not disturb it, two more eggs were laid, and the young birds hatched out successfully. Thus the spoils of one home proved to be the foundations of another.

ROBERT PATTERSON.

Belfast.

White Wagtail in Co. Antrim.

While looking for a Grasshopper Warbler on May 21st at the Lagan near the old Belfast Waterworks, accompanied by Nevin H. Foster, we saw sitting demurely in a thorn bush a White Wagtail (*Motacilla alba*). We were struck by its very white appearance, by its tail being down instead of up, and its quietness, and tameness, letting me within four feet of it. We had ample time to examine it, and note its appearance, and although neither of us had seen a White Wagtail alive before, we have not the slightest doubt it was *M. alba*. This is an addition to the list of Ulster birds.

ROBERT PATTERSON.

Belfast.

Turnstones on Lough Neagh.

On May 24th I was on Ram's Island, Lough Neagh, and was astonished to find a small flock of Turnstones (*Streptilas interpres*) on the shingly beach at the north end of the island. There were five of them, in full breeding plumage, and in the bright sunshine were exceedingly beautiful. Eight Dunlins (*Tringa alpina*), also in summer plumage, were with them, and all were feeding on minute crustacea at the water's edge. I cannot find any record of Turnstones on an inland lake in Ireland before.

ROBERT PATTERSON,

Belfast.

Dunlin breeding on Lough Erne.

While on the B.N.F.C. long excursion to Enniskillen in July, Mr. J. A. Henderson, of Lisbellaw, informed me that he had obtained Dunlins' eggs in that locality in the summer of 1898, and he kindly sent me at the hotel one of the eggs for my inspection. It undoubtedly belongs to *Tringa alpina*, taken at the "Kerrigans," Lough Erne, and Mr. Henderson is to be congratulated on having placed the breeding of the Dunlin in Co. Fermanagh beyond a doubt.

ROBERT PATTERSON.

Belfast.

GEOLOGY.

Some good Fossil localities in Cretaceous rocks, Belfast District.

As the best of the old fossil localities in the Cave Hill, Whitewell, and Squire's Hill quarries are now much obscured by *débris*, perhaps a short list of sections where fossils may now be more easily obtained, may be useful. The quarry sections of course vary from year to year, but they are all clear now. The new quarry at Larne has yielded me fish teeth, Brachiopods, Echinoderms, and some Sponges, all in excellent condition. Kilcoan quarry, Ballycarry, has been reopened, and will of all the places best repay the worker; bands of Brachiopods may be seen on the new sections, with many Urchins, some Gasteropods, and Sponges, the latter in very fine condition. Kilcorrig quarry, near Lisburn, shows at present remarkably fine sections on the Upper Chalk, with above-mentioned genera and some Ammonites. It was here the late Prof. Ralph Tate obtained so many species of univalves. Of the old well-known localities, Cloughfin and Hillsport, Islandmagee; the Greensand at North Glen, Woodburn; the Chalk, Greensand, Yellow Sands, and Glauconite at Whiterock quarry on Black Mountain, always well repay a visit. At Colin Glen the sections still yield the rare little Brachiopod *Waldheimia hibernica*, its only Irish station, with good fish teeth and many other fossil forms. Workers will find the latest lists for most of the sections in "The Cretaceous Strata of Antrim," by Dr. Hume, *Q. J. G. Soc.*, Nov., 1897.

R. BELL.

Belfast.

Holaster lævis De Luc, var. *planus* Mantell, in Chloritic Chalk, Belfast.

As this echinoderm does not seem to have been noted in any list of fossils from Irish Cretaceous rocks, I would like to record it from the nodular band in the Chloritic Chalk at Squire's Hill, where I obtained one good specimen. In England it is stated to be common in the Upper Greensand at Clute Farm, Wilts; found also in the Grey Chalk near Folkestone, Lower Chalk near Lewes, Sussex, and Dover.

R. BELL.

Belfast.

REVIEWS.

CONCERNING CUCKOOS.

The Early Life of the Young Cuckoo, by W. PERCIVAL WESTELL, M.B.O.U., author of "A Year with Nature," etc. Illustrated with four remarkable photographs taken direct from Nature by J. Peat Millar. London: Thomas Burleigh, 376 Strand, 1902. Pp. 26. Price 1s. net.

A very important service was rendered to ornithology in the summer of 1899 by Mr. John Craig, an Ayrshire naturalist, who set at rest conclusively the long- vexed question as to the young Cuckoo's method of ridding itself of its foster-brethren by a series of excellent photographs, exhibiting the bird in the act of ejecting a young Yellow-hammer. The photographs were, we believe, exhibited at the meeting of the British Ornithologists' Union in 1900. Mr. W. Percival Westell has entitled himself to the thanks of naturalists by reproducing four of them in the little book before us, together with a brief *résumé* of Mr. Craig's observations and experiments while he had the young Cuckoo under his eye. It may be noted that the photographs confirm the almost complete accuracy of the account given by Jenner and other observers, on whose veracity some doubts had from time to time been cast. They also corroborate the statement that when about ten days old the murderous instinct of the young Cuckoo disappears, and it will then live on amicable terms with another young bird placed in the nest. Mr. Westell has rather spoilt his pamphlet by digressions on the origin of the Cuckoo's peculiar habit, on which he has no suggestions of any value to offer. He quotes as "the most practical explanation he has yet seen" of the parasitic instinct, the theory that "if the bird did build a nest for itself, and laid four or five eggs to the clutch, one on each succeeding day, the instinctive desire implanted in the young Cuckoo of clearing everything out of the nest in which it is hatched is so strong that there would be a struggle among them for possession of the nest, the weakest would perish, and they would be in a worse position than at present for perpetuating their species." It ought, we think, to have been sufficiently obvious to Mr. Westell that this so-called explanation explains nothing. It involves the wholly gratuitous and improbable assumption that the young Cuckoo had developed its fratricidal instinct before the parasitic instinct originated in the old Cuckoo. There is nothing original about the suggestion that these two instincts are supplemental to each other; but if either of them preceded the other it appears to us much the more probable view that the order followed was the opposite to that which Mr. Westell's hypothesis requires. In conclusion we may point out that the name of the Crested Tit (p. 17), in a list of Western Palæarctic species in whose nests the Cuckoo's egg has been found, is evidently a misprint for that of the Crested Lark.

IRISH ENTOMOLOGY.

A Catalogue of the Lepidoptera of Ireland. By W. F. DE VISMES KANE, M.A., M.R.I.A., F.E.S., D.L. (Reprinted from the *Entomologist*). With a coloured plate. Pp. xviii. + viii. + 166. London: West, Newman & Co., 1901.

A List of the Beetles of Ireland. By REV. W. F. JOHNSON, M.A., F.E.S., and J. N. HALBERT. *Proc. R.I.A.* (3) vol. vi., pp. 535-827. Dublin, 1902.

It is perhaps appropriate that the present number of the *Irish Naturalist*, containing a record of the life-work of that pioneer-prince of Irish entomologists, A. H. Haliday, should call attention also to the labours of his followers in recent years. The publication of these two memoirs should call forth the gratitude of all who are interested in the natural history of Ireland, for here may be found reliable information, so far as we know it, as to the occurrence and distribution of Butterflies, Moths, and Beetles in this country. Both Mr. Kane and Messrs. Johnson and Halbert have spared no pains in verifying old records. The result is that many species, hitherto reputed to be Irish, have been expunged from our lists, and the lepidopterist or coleopterist of the future will have in these catalogues an entirely reliable foundation on which to build up that complete knowledge of the Irish fauna to which we look forward in the future golden age of science.

Both lists, then, may be depended upon as trustworthy and accurate; but in the presentation of the facts, Mr. Kane's list shows a want of system in comparison with that of Messrs. Johnson and Halbert. The latter authors give a complete bibliography to which reference is constantly made, whether the statement quoted is accepted, corrected, or rejected; the reader can therefore look up any controverted point should he wish to do so, and know exactly on whose authority any opinion rests. Moreover, the distributional facts are given in a form most convenient for reference—first, the provinces, then (except in the case of common and universally distributed species), the counties arranged in regular geographical order, detailed localities being given with reference to the bibliography in the case of the scarcer or more interesting beetles. Finally, there is an index of the genera. In short, the "List" gives the impression that its authors take faunistic work seriously, and consider that if worth publishing at all it is worth treating as systematically as any other branch of scientific study. Mr. Kane's list, on the other hand, contains no bibliography, only a few scattered references being given to guide the student to published records, while the distributional facts are often set forth in the most unsystematic way. There are two supplemental lists in which occur species not included in the main list, but no indication is given by which such species may be distinguished from those that are mentioned only for the sake of fresh localities.

The most noteworthy facts in Mr. Kane's list are furnished by the Hon. R. F. Dillon's collections at Clonbrock, and the work of the Messrs. Donovan in Co. Cork. These have been already mentioned in the *Irish Naturalist*

and they illustrate the frequent restriction of southern species in Ireland to the south and west of the country. Perhaps the most interesting species in the whole list is the tiny moth *Zelleria phillyrella*, Mill.—a south-eastern European insect, which has lately been discovered at Renvyle, Connemara, but is unknown elsewhere in the British Isles. The interest of the Beetle list certainly centres around the shores of Lough Neagh. Here Haliday long ago discovered *Pelophila borealis* and *Dyschirius obscurus* (the latter is still unknown elsewhere in our islands); and here Messrs. Johnson and R. Patterson have captured species of *Bembidium* and *Stenus*, identified respectively in the list before us as *B. argenteolum*, Ahr., and *S. palposus*, Zett., both additions to the Britannic fauna.

Distributional studies in Ireland have received so strong an incentive from Dr. Scharff's "History of the European Fauna," that it is necessary to consider the bearing of these two insect lists on his views. Messrs. Johnson and Halbert refer, in their introduction, to the distributional groups suggested by Dr. Scharff, and feel able to place many of the Irish beetles definitely in one or other of these groups. Briefly summarising the result, we may say that the Northern and Alpine faunas are specially characteristic of Ulster, Connaught, and Munster. The Southern fauna (Oriental of Scharff), is in Ireland partly restricted to the east coast (Waterford to Antrim), and partly to the south and west; while the Lusitanian fauna is, among the beetles, represented chiefly by shore-haunting species, some occurring chiefly in the south-west, others in the south-east of Ireland. The authors of our beetle-list give us therefore the facts, admirably arranged for study, and leave us to draw our own deductions. As to the pre-or post-glacial age of the fauna, or any section of it, they are discreetly silent.

But Mr. Kane, in the introduction to his list, discusses the origin of the Irish fauna at considerable length, with especial reference to the influence of the Ice-age. His knowledge of the general natural history of Ireland must command respectful attention for his opinions, which are in all respects antagonistic to Dr. Scharff's, as he believes in the total extinction of the pre-glacial fauna, and the immigration subsequent to the Ice-age of all the species now inhabiting the country. We hope that students of the subject, who read Mr. Kane's introduction, will not be content without a first-hand reference to Dr. Scharff's writings. The latter naturalist would, we believe, strongly demur to the statement that the Eastern ("Siberian") animals "were driven south from Siberia by the increase of the northern ice-cap," and he takes the greatest pains to impress upon his readers that the Irish Stoat and Reindeer do *not* belong (as Mr. Kane suggests) to this Eastern, but to the older Northern fauna. Mr. Kane's attempt to minimise the differences between the Irish and British faunas by stating that "the Common Hare must once have existed here [in Ireland], being found in the Isle of Man, which is strictly Hibernian as regards its fauna," can hardly be taken seriously. In spite of the late Professor Carvill Lewis's researches, Mr. Kane carries the general glaciation of Ireland to the extreme south, and he does not consider that there

is evidence for the survival through the Ice-age of any of our present fauna to the south or west of the present Irish area. He gives as an original suggestion towards the solution of the problem, a post-glacial land-connection between Ireland and Brittany, imagining a southward extension of the presumed elevation along the western Irish seaboard, accompanied by a subsidence towards the east, which cut off direct communication between Great Britain and Ireland. Mr. Kane is inclined to lay much stress on climatic and environmental influences and comparatively little on geographical changes. This is a disputable point upon which, as upon the pre- or post-glacial question, much difference of opinion can only be expected. We have no doubt that the pre-Pleistocene age of at least a considerable section of our fauna will some day be acknowledged on all hands. And it is becoming evident that extreme scepticism about the glacial conditions, as interpreted by most geologists, need not necessarily accompany belief in the survival of many of our animals and plants through the Ice-age. Not only, as has been so often pointed out, may a temperate or even a semi-tropical flora prevail in the neighbourhood of great glaciers, but the surface of a glacier may itself, as evidenced by the present conditions in Alaska, bear soil and vegetation which may afford shelter to animals. The fascinating problems of Irish natural history will not be fully solved until an exhaustive study of the Pliocene and Pleistocene deposits has been correlated with the fullest possible accumulation of distributional facts. The two insect-lists here reviewed bring us an appreciable step nearer to the second of these most desirable conditions.

G. H. C.

BRITISH AND IRISH LIVERWORTS.

The Hepaticæ of the British Isles, being figures and descriptions of all known British species. By WILLIAM HENRY PEARSON. Vol. I., Text, vi. + 520 pp.; Vol. II., 228 Plates. London: Lovell, Reeve, & Co., 1902. Super Royal 8vo. Price, with coloured plates, £10 10s.; uncoloured, £7.

The study of the British Hepaticæ has been retarded for many years for want of a good work on the subject. Hooker's "*British Jungermanniæ*," a splendid work, published in 1816 in folio, soon went out of print. Dr. Carrington's book, commenced in 1874, came to an end before a quarter of the species had been described. Mr. Pearson has now supplied this want, and, in some respects, in a way which has not been done before for the British species. A very full and detailed description is supplied of each species, with measurements of all the parts, and a whole plate is devoted to the delineation of each. The work is preceded by a short practical Introduction, which contains comparative tables of the sizes of the plants and of their leaf-cells, and a diagram and table of the direction of the leaves, which will be most useful. This is followed by a glossary of terms, not useless either, since it contains the word *umbraculiform*, and by a Bibliography.

Dr. Spruce's classification, as we might expect, has been adopted, and the detailed description of species is preceded by a translation of his "Conspetus Hepaticorum," from his great work on South American Hepaticæ. The admirable descriptions drawn up by one who is familiar with the plants in the field, and with exotic species, and fully illustrated as they are on the plates, together with the observations in which similar species are contrasted and separated, will be of the greatest service for the identification of the species of this difficult family of plants. The descriptions contain no mention of the seasons of inflorescence and fruiting, probably from want of sufficient data; a want which we hope may be supplied by observers.

The plates form a thick volume by themselves. The drawings, while a great improvement on Carrington's, are rather disappointing, not so life-like as those of Hooker, too stiff and diagrammatic, and not so well shaded. We refer to the uncoloured; we have not seen the coloured edition. The very useful life-size figures are not so fine and accurate in detail as they should be, and may have suffered in engraving. The separate organs illustrated number about fifteen on a plate, so that the total number of figures is very large.

Its chief drawback is the excessive price of the work. A cheaper, handier, and not less serviceable book might have been formed by judicious arrangement of the text, with smaller print for less important portions, such as the measurements, and explanations of plates. One would think the object had been to make it as bulky as possible in keeping with the price. Why do our publishers not follow the better continental models? Although it might have curtailed the illustrations to put four species instead of one on a plate, the corresponding reduction in price would have made the work available to a larger number of persons. Now it is prohibitive. The date on the title-page is 1902. To be correct it should be 1899-1902, as the first part appeared in the former year. Several of Mr. Macvicar's important additions to our flora have been added during the progress of the work, such as *Jungermania obtusa* Lindb. and *Pellia Neesiana* Limpr. It is a pity that his latest discoveries of no less than seven species were made too late to be included.

The Liverworts will always have a peculiar interest for Irish botanists, as the group is so well represented in this country, especially in the South-west. Out of the 219 species described by the author, three-fourths or 165, grow in Ireland. Excluding the true alpine species the proportion would be much greater.

The distribution of the species in Great Britain is given according to the botanical provinces. Why were the Irish provinces not included? Irish botanists will be disappointed to find that while the older records are given, many recent ones have been ignored, especially those from the North of Ireland. To students of distribution this may be misleading. For example "South of Ireland" is the locality put for *Jubula Hutchinsiae* (Hook.) Dum., a species recorded from three localities in Co. Down. The distribution of *Pleurozia cochleariformis* (Weiss) Dum. is interesting,

as it is confined to Scotland and Ireland. Several Kerry localities are noted, but there is no hint that it grows also in Counties Antrim, Derry, and Down. The following species are not confined to the South as might be imagined, but have been recorded also from the North-east, thus forming a link of connection between the moss flora of Kerry and the west coast of Scotland.

Frullania fragilifolia, Taylor.

Lejeunea Mackaii (Hook.), Spreng.

L. ovata, Tayl.

L. hamatifolia (Hook.), Dum.

L. ulicina, Taylor.

L. calcarea, Lib.

Adelanthus decipiens (Hook.), Mitt.

Cephalozia curvifolia (Dicks.), Dum.

Pedinophyllum interruptum (Nees),
Lindb.

Jungermania bicrenata, Schmidel.

Nardia compressa (Hook.), Gr. &
Benn.

Blasia pusilla, L.

These are not all the omissions of which we have to complain, but we have not space to point them out.

The name *Jungermania Lyoni* Taylor has been substituted for the ambiguous *J. quinquedentata* Web., as "it is absurd to call a plant which has uniformly three teeth *quinquedentata*." "Black Mountains," the only Irish locality for *Marsupella Funckii* (Web. and Mohr.), Dum. appears in Moore's list, "Black Mountain near Belfast 1837."

Mr. Pearson's treatment is conservative. We are relieved to find that he has introduced very few new species, and that he has omitted many slight varieties. One would have liked, however, to have heard his reasons for doing so, and why so many of the varieties published in "Carrington and Pearson's Fasciculi" have been passed over without mention, such as *Frullania tamarisci* var. *cornubica* Carr. *Scapania intermedia* Husnot and *S. purpurascens* Tayl. MS. have been raised to the rank of species. So also *Lophozolea cuspidata* Limpr., and *Jungermania socia* Nees, a species found in Wales. *J. porphyroleuca* Nees is united to *J. ventricosa* Dicks., and the new variety, *Whiteheadii*, described for a Yorkshire form.

Nardia silvettæ (Gottsche) is described and distinguished from its near neighbour *N. scalaris* (Schrad.) Gr. & Benn. Most of the gatherings of *Pallavicinia hibernica* (Hook.) Gr. & Benn., are assigned to the var. *Wilsoniana* (Gottsche) only a few to the type, and a new var. *leptodesmu* Tansley, is the plant from Malahide.

A clear and useful key to the genus *Fossombronia* has been adopted from Stephani, and it is hoped that the full description and illustrations of *Fossombronia*, *Riccia*, and other neglected genera near the end of our list, now given for the first time in this country, may lead to a fruitful study of the British species.

It may seem that we have dwelt more on the imperfections than on the merits of the work, and that an Irish grievance has taken up much space. The book is so good we are only disappointed it is not better, and for this the publishers seem more to blame than the author. It is a great and laborious work which has now been completed, in which we have the results of the author's lengthened experience and unrivalled knowledge of the British species of a very difficult, but very beautiful and instructive, order of plants.

C. H. WADDELL.

A CONTRIBUTION TO THE GLACIAL GEOLOGY OF
COUNTY DUBLIN.

BY J. DE WITT HINCH.

[Read before the Dublin Naturalists' Field Club, March 5, 1901.]

IN 1874 Rev. Maxwell H. Close contributed to the *Geological Magazine*¹ an account of the high-level glacial drift of County Dublin. In that paper the author describes these upland deposits of shelly drift, which occur on the Dublin hills at levels varying from 850 to 1,200 feet. In this paper is given a list of marine mollusca, found in the sand and gravel beds near Ballyedmonduff at an elevation of over 1,000 feet above sea level.

Since 1874 investigations into the nature of the lowland glacial deposits have taken place from time to time, two of which call for special mention:—The reports of the British Association Committee on the "Manure" Gravels of Wexford, the second² of which gives a list of marine mollusca obtained from the shelly gravels near Ballybrack on the edge of the sea; and papers on Irish glacial deposits by Prof. W. J. Sollas and Mr. Lloyd Praeger, the second³ of which deals with the Kill-o'-the-Grange beds and give lists of marine mollusca and foraminifera collected from these sections, which lie at an elevation of 150 feet above sea level.

A very curious point about these shell-bearing deposits was the fact that between the Kill-o'-the-Grange and less elevated beds, and those of Glendoo Wood at a level of 700 feet higher, a complete gap appeared to exist. Messrs. Sollas and Praeger found chalky shell remains near Rathfarnham, but above this there was nothing to connect the low level and high level shelly drifts.

The present paper is an account of work undertaken to obtain more evidence as to a possible connection between these two sets of beds—to see if satisfactory evidence could be brought forward to lessen the gap between them. With

¹ The elevated shell-bearing gravels near Dublin: *Geological Magazine*, 1874, p. 193.

² British Association Report, 1888, pp. 139-140.

³ *Irish Naturalist*, Dec., 1895.

this end in view the drift on the northern slope of the Dublin hills has been examined, especially between 400 and 800 feet above sea level, and all sections carefully searched for shells.

In most of the sections examined the results were extremely meagre, percolating water having reduced the shells to such a chalky condition as to render determination of species a matter of great difficulty, and only from localities specially protected were any satisfactory results obtained. Out of over a dozen sections—scattered over the northern slope of the Dublin hills, from Ballyedmonduff on the east to Glenasmole on the west—the following four yield the best results:—

The first is a large pit, 100 yards north of the Glendoo Wood, on the road leading from Rockbrook to Glencullen. This pit, 850 feet above sea level, is composed of roughly stratified sand and gravel—chiefly limestone, but containing granite, sandstone, mica-schist, and Chalk flints. The shells found here were very chalky, breaking when touched, but the following species were made out:—

LAMELLIBRANCHIATA :

<i>Pecten opercularis</i> , Linn.	<i>Astarte borealis</i> , Chem.
<i>Cardium tuberculatum</i> , Linn.	<i>A. sulcata</i> , Da Costa.
<i>C. norvegicum</i> , Spreng.	<i>Artemis exoleta</i> , Linn.

Of these *Astarte borealis* is at present confined to Arctic and Scandinavian seas.

The second locality consists of two large pits just outside the entrance gate of Larch Hill demesne. This demesne is situated at the entrance to the glen formed by the slopes of Kilmashogue Hill and Tibbradden Mountain, and known as Kelly's Glen. The section is a very striking one, and merits a detailed description. The beds composing the upper pit, 650 feet above sea-level, occur in the following ascending order:—A bed 18 feet thick, consisting of large granite boulders, limestone pebbles, and granitic sand; many of the granite boulders measure as much as 20 × 9 × 9 inches, and form a quite unique feature in the composition of the bed; smaller blocks of basalt, conglomerate, sandstone, white quartz, Chalk flints, and mica-schist also occur. From this bed, which shows only the very roughest signs of stratification, forty species of mollusca and one species of cirripede

have been obtained. Over this bed, and covering it like a protective hood, is a layer of fine Boulder-clay varying from a foot to three feet in thickness. In this bed Mr. Praeger (whom I have to thank for aid at every stage in the work of collecting, and advice in the writing of this paper) found a fragment of *Astarte compressa*. On this bed of Boulder-clay, in the left hand corner of the section, is a large accumulation of pebbles cemented with carbonate of lime. Over the Boulder-clay and the calcrete is a bed of limestone sand and gravel, with an occasional erratic of granite, mica-schist, etc. This bed is over 30 feet in thickness, and yields a few shelly fragments on careful examination. The adjoining pit reproduces the granite boulder bed, and the upper limestone gravel, but the calcrete is absent, and the Boulder-clay bed is reduced to a thickness of a few inches. The following is a list of the mollusca obtained from the granite boulder bed, in the naming of which I have received valuable assistance from Mr. E. T. Newton :—

LAMELLIBRANCHIATA :

Ostrea edulis, Linn.—Mr. W. B. Wright collected a piece of this shell $1\frac{3}{4} \times 1\frac{1}{2}$ inches. I got four other fragments. *N.S.

Pecten varius, Linn.—One fragment. N.S.

P. opercularis, Linn.—Two fragments. N.S.

P. maximus, Linn.—Four fragments. N.S.

Mytilus sp.—Fragments.

Nucula nucleus, Linn. (?)—One fragment.

Nuculana (Leda) pernula, O. F. Müller.—Two complete valves and forty fragments, mostly hinges. N.

Cardium echinatum, Linn. (?)—Five fragments.

C. tuberculatum, Linn. (?)—Three fragments.

C. edule, Linn.—Two half valves, thirty fragments. N.S.

C. norvegicum, Speng.—Four fragments. N.S.

Cyprina islandica, Linn.—Thirteen hinges and two hundred fragments. B.N.

Astarte borealis, Chem.—Twenty hinges. N.

A. compressa, Mont.—Eight complete valves, twenty fragments. B.N.

A. sulcata, Da Costa.—Twenty fragments. N.S.

Artemis exoleta, Linn.—Two hinges. N.S.

Venus castna, Linn. (?)—Three fragments. N.S.

* N.S. signifies that the distribution of this species is north and south of Britain; B.N. that the distribution is confined to British and northern seas; N. that the species is extinct in the British seas, and is arctic in distribution at the present day.

- Venus verrucosa**, Linn.—Four hinges. N.S.
Tapes decussatus, Linn.—One fragment. N.S.
Tellina balthica, Linn.—Eight complete valves, 116 hinges.
 Many of the specimens retain their original colouring to a marked degree. N.S.
Donax vittatus, Da Costa.—One fragment. N.S.
Mactra sp.
Corbula gibba, Olivi.—Two hinges. N.S.
Glycymeris (Panopea) norvegica, Speng.—Four fragments.
 B.N.
Mya arenaria, Linn.—Three hinges. N.S.

GASTROPODA:

- Dentalium entalis**, Linn.—Seven fragments. N.S.
Trochus magus, Linn.—One fragment. N.S.
T. cinerarius, Linn.—One fragment. N.S.
Littorina litorea, Linn.—Six fragments. These fragments retained their original colouring. N.S.
Turritella terebra, Linn.—Four perfect specimens, fifty fragments. N.S.
Natica catena, Da Costa.—Two fragments. N.S.
Aporrhais pes-pelecani, Linn.—One specimen. N.S.
Cerithium reticulatum, Da Costa.—Two perfect and two broken specimens. N.S.
Purpura lapillus, Linn.—Three fragments. N.S.
Murex erinaceus, Linn.—Five fragments. N.S.
Trophon clathratus, Linn.—One perfect specimen. N.
T. bamffius, Donovan.—Two perfect and two broken specimens.
 B.N.
Nassa reticulata, Linn.—Four almost complete specimens, seven broken. N.S.
N. incrassata, Müll.—One complete specimen, and four broken.
 N.S.
Pleurotoma costata, Donovan.—One complete specimen. N.S.
P. turricula, Brocchi.—One complete and four broken specimens. B.N.

CIRRIPIEDIA:

- Balanus porcatus**, Da Costa. N.S.
Balanus sp.

The most important point about this collection, after having served its purpose in lessening the gap between the high and low level fossiliferous drift, is the condition in which the shells were found. In all the high-level gravel sections examined the shells were found in a very shattered and decayed state; in no case was there anything like a whole shell obtained, and mostly the fragments crumbled to chalky flour

when touched. At Larch Hill, on the contrary, all the shells from the upper pit could be handled quite as freely as recent ones, many retained some of their original colouring, and a number of the Gastropoda were perfect. This retention by the shells of texture and colour, appears to me to be the result of the protection afforded to the granite boulder bed by the overlying Boulder-clay: the Boulder-clay band is practically impervious to percolating water, and this prevents the surface drainage from reaching the shells and destroying them in the usual manner. This is well seen after heavy rain, when the water from the overlying sand and gravel either accumulates in the inequalities of the Boulder-clay band or runs off it in streamlets: another proof of this protection by the Boulder-clay is the fact that in the lower pit, where the Boulder-clay thins out, the shells are in the chalky condition of other localities, though much more perfect.

The shells, as a whole, indicate exposure to very rough treatment. The extent to which this has taken place can be understood by the fact that out of over 2,000 fragments collected, only 13 perfect Gastropods, and in the Lamellibranchs 18 perfect valves, were obtained; and a reference to the list will show that it is only the small, compact shells which have escaped destruction. *Cyprina islandica*, which might be expected to resist great pressure, is represented by over 100 fragments under an inch in length, the powerful hinge being the only part of the shell strong enough to escape destruction.

Excluding doubtful species, in the Larch Hill list we have a group of 35 mollusca—19 Lamellibranchs and 16 Gastropods; of these, three species (*Astarte borealis*, *Leda perrula*, and *Trophon clathratus*) are arctic shells not now found in the British seas. Five species (*Astarte compressa*, *Pleurotoma turricula*, *Glycimeris* [*Panopea*] *norvegica*, *Cyprina islandica*, and *Trophon Bamffius*) have at the present time outside the British seas a completely northern range; the remaining 27 species have a distribution both north and south of Britain. It will be seen that the fauna has a distinctly northern facies, the arctic and northern shells constituting nearly one-fourth of the whole list, and pointing to a much colder climate than at present obtains in the Irish sea area.

The third section is in the Boulder-clay of the Edmondstown River near Rockbrook. This section, which is 400 feet above sea-level, was pointed out to me by Mr. Lamplugh of the Geological Survey. The shells were dug out of a stiff Boulder-clay, and though broken were very fresh in appearance, with sharp angles and sculpture, some retaining their original glaze. The following species were obtained :—

LAMELLIBRANCHIATA :

<i>Nuculana</i> (<i>Leda</i>) <i>permula</i> , <i>O. F. Muller.</i>	<i>Venus</i> <i>sp.</i>
<i>Cardium echinatum</i> , <i>Linn.</i> (?)	<i>Tellina</i> <i>sp.</i>
<i>Cyprina islandica</i> , <i>Linn.</i>	<i>Psammobia</i> <i>sp.</i> (?)
<i>Astarte borealis</i> , <i>Chem.</i>	<i>Saxicava rugosa</i> , <i>Linn.</i>
<i>A. compressa</i> , <i>Mont.</i>	<i>Mya arenaria</i> , <i>Linn.</i>
<i>A. sulcata</i> , <i>Da Costa.</i>	

GASTROPODA :

<i>Dentalium entalis</i> , <i>Linn.</i> (?)	<i>Turritella terebra</i> , <i>Linn.</i>
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ANNELIDA :

Serpula, *sp.*

CIRRIPIEDIA :

Balanus Hameri, *Ascanius.*

Of the above, *Astarte borealis* and *Leda permula* have at the present day an arctic range.

The last section to be described is in the Boulder-clay of the same stream, just south of Rathfarnham, 150 feet above sea level. The shells were in the same fresh state as at Rockbrook, the fragment of *Astarte borealis* retaining the original brownish epidermis. The following species were collected :—

LAMELLIBRANCHIATA :

<i>Pecten opercularis</i> , <i>Linn.</i>	<i>Cyprina islandica</i> , <i>Linn.</i>
<i>Nuculana</i> (<i>Leda</i>) <i>permula</i> , <i>O. F. Muller.</i>	<i>Astarte borealis</i> , <i>Chem.</i>
	<i>A. sulcata</i> , <i>Da Costa.</i>
<i>Cardium echinatum</i> , <i>Linn.</i> (?)	<i>Artemis</i> <i>sp.</i>

GASTROPODA :

<i>Turritella terebra</i> , <i>Linn</i>	<i>Pleurotoma turricula</i> , <i>Brocchi.</i>
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The officers of the Geological Survey engaged in mapping the drift of Co. Dublin discovered a shell-bearing gravel deposit on the northern bank of the River Liffey, beside the ferry, opposite Palmerstown. This section is of great importance, as it is the most inland section recorded up to the

present. Mr. Lamplugh very kindly informed me of the existence of this section, which on examination yielded the following species:—

LAMELLIBRANCHIATA :

Pecten opercularis, *Linn.* (?)Cardium, *sp.*Cyprina islandica, *Linn.*Astarte borealis, *Chem.*A. compressa, *Mont.*A. sulcata, *Da Costa.*

GASTROPODA :

Dentalium entalis, *Linn.*Littorina *sp.*Turritella terebra, *Linn.*Trophon Bamffius, *Donovan.*Nassa incrassata, *Müller.*

The position in which the shells in all these sections were found is of considerable interest, for in no case was there any indication that the shells lived in the beds in which they now occur. In fact, the evidence pointed the other way, all the valves of the Lamellibranchs being separated and scattered up and down the sections in a most indiscriminate manner. In none of the localities examined was there anything of the nature of a beach seen.

The following is a list of localities in the South Dublin district from which shells have been collected, giving heights above sea level, the number of species obtained; doubtful species being excluded, and the number of exotic forms found in each locality specified:—

—	Elevation.	Number of Species.	Arctic.	Northern.
Ballybrack, . . .	Sea-level,	57	5	7
Palmerstown, . .	100 feet,	9	1	3
Kill-o'-the-Grange, . .	150 „	22	1	6
Rathfarnham, . . .	150 „	7	2	2
Rockbrook, . . .	400 „	8	2	2
Larch Hill, . . .	650 „	35	3	5
Glendoo, . . .	850 „	6	1	0
Ballyedmonduff, . .	1,000 „	13	0	3

The term "Arctic" here includes species which are extinct in the British seas at the present day, but have an Arctic and Scandinavian range. "Northern" includes those which have an Arctic and British habitat, but do not range south of Britain. It will be seen from this table that while the number of species collected in the various stations varies greatly—owing partly to deficient collecting—there is a persistent proportion of the shells exotic, with an arctic habitat at the present day. *Astarte borealis*—a typical arctic species—occurs in every deposit from sea-level up to Glendoo Wood. *Leda pernula*—another typical glacial species—occurs at sea-level and at three localities between 150 and 650 feet. When the species having a northern range at the present day are added, the boreal aspect of the fauna becomes very clear, and as this character remains constant from sea-level to 850 feet, the continuity of the deposit may—provisionally at least—be assumed. A great amount of work at erratics and shell-history remains to be done, and this may modify this conclusion in certain respects, but it is doubtful if the general broad uniformity of the fauna of the high-level and low-level Drift deposits will be overturned.

As this paper deals merely with a possible correlation of the high and low-level drifts by a comparison of their respective faunas, any remarks on the probable mode of formation of the deposits in general may be out of place; but the following suggestions are offered. With the advance of the Irish Sea Glacier the Boulder-clay was laid down to a height of over 1,200 feet on the Dublin hills, the contained shells being carried as erratics along with the limestone, Chalk flints, and mica-schists. At the close of the Glacial period, when the retreating ice-sheet would form lakes by damming back the drainage from the hills, the sands and gravels were probably formed; the decaying ice-sheet supplying the water necessary to erode the Boulder-clay and supply materials for the formation of the stratified deposits. The torrential nature of the earlier stages of this period is very well shown by the boulder bed of Larch Hill, where the deposit has the appearance of an immense shingle bed thrown up by a river in full flood, the granite boulders being probably supplied from some source quite near at hand.

National Library, Dublin.

OBSERVATIONS ON THE WEIGHTS OF BIRDS' EGGS.

BY N. H. FOSTER.

To the *Irish Naturalist* of November, 1901, MR. W. H. Workman contributed a paper giving the result of his observations on the weights of birds' eggs. During this year I have been giving some attention to the subject, and now append the measurements and weights of those I have been able to procure.

As is well known, an egg loses weight during the process of incubation, and as a result of my observations I have come to the conclusion that this loss amounts to about 15 per cent. of the weight of the fresh egg. Such being the case, I have given the weights of *fresh* eggs, but in those cases where I have been unable to procure eggs in this condition, the state of incubation is noted.

The eggs of all our birds also present differences in size in the same species—accounted for, no doubt, by the age and state of health of the bird—and where I have obtained clutches showing a considerable variation, I have given the measurements and weights of a large-sized and small-sized clutch.

My list includes 56 species, almost all of which were taken in Co. Down, and I regret having failed this season to obtain nests containing eggs of the following:—Ring Ousel, Wheatear, Dipper, Long-tailed Tit, Tree Creeper, Pied Wagtail, House Martin, Siskin, Linnet, Twite, Corn Bunting, Barn Owl, Heron, Mute Swan, Shoveller, Teal, Wigeon, Tufted Duck, Stock Dove, Partridge, Ringed Plover, Woodcock, Redshank and Great-crested Grebe, all of which breed in this neighbourhood or within easy distance of it.

Each of these sets is a clutch from one nest, except where the letters "a" and "b" signify two separate clutches.

MISSEL THRUSH (*Turdus viscivorus*).

Inch.		Inch.		Grains.		Inch.		Inch.		Grains.
1·2	×	·87	—	123		1·2	×	·87	—	122
1·16	×	·87	—	117		1·19	×	·86	—	118

SONG THRUSH (*Turdus musicus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
(a) 1'06	×	'79 — 88	(b) 1'06	×	'82 — 94
1'02	×	'8 — 88	1'06	×	'84 — 98
1'06	×	'78 — 87	1'08	×	'82 — 95
1'1	×	'78 — 89	1'06	×	'86 — 101

BLACKBIRD (*Turdus merula*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
(a) 1'24	×	'85 — 100	(b) 1'18	×	'88 — 127
1'1	×	'78 — 72½	1'16	×	'88 — 123
1'12	×	'86 — 91½	1'18	×	'88 — 126
1'08	×	'8 — 86	1'18	×	'88 — 125½

STONECHAT (*Pratincola rubicola*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'73	×	'57 — 32	'75	×	'56 — 31
'74	×	'57 — 31½	'76	×	'57 — 34
'73	×	'56 — 31			

REDBREAST (*Erithacus rubecula*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'76	×	'57 — 35½	'78	×	'56 — 33½
'78	×	'58 — 38	'75	×	'56 — 31
'77	×	'58 — 37	'78	×	'57 — 36
'78	×	'58 — 37½	'76	×	'56 — 35

WHITE-THROAT (*Sylvia cinerea*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'76	×	'55 — 30	'76	×	'56 — 33
'77	×	'55 — 30½	'76	×	'55 — 31
'76	×	'55 — 30½			

GOLDCREST (*Regulus cristatus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'54	×	'42 — 13	'53	×	'41 — 12
'54	×	'4 — 11½	'53	×	'42 — 12
'53	×	'4 — 12	'53	×	'41 — 12½
'53	×	'42 — 12	'53	×	'43 — 13

CHIFFCHAFF (*Phylloscopus rufus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'56	× '47	— 17	'56	× '46	— 16
'56	× '45	— 15½	'56	× '46	— 16
'56	× '45	— 15½	'57	× '46	— 16

WILLOW WARBLER (*Phylloscopus trochilus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'57	× '47	— 17½	'59	× '48	— 18½
'6	× '48	— 19	'59	× '48	— 18½
'59	× '48	— 19	'58	× '48	— 18

SEDGE WARBLER (*Acrocephalus phragmitis*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'65	× '5	— 21½	'7	× '52	— 25
'65	× '51	— 22½	'66	× '5	— 23
'68	× '53	— 26			

GRASSHOPPER WARBLER (*Locustella naevia*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'71	× '55	— 27	'71	× '55	— 28
'71	× '55	— 28	'71	× '55	— 27

HEDGE SPARROW (*Accentor modularis*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'84	× '56	— 36	'8	× '56	— 35
'82	× '56	— 36	'78	× '56	— 34

GREAT TIT (*Parus major*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'73	× '55	— 29	'72	× '55	— 29
'7	× '54	— 27½	'72	× '54	— 29
'72	× '54	— 28	'72	× '54	— 29
'71	× '53	— 27	'72	× '55	— 29

COAL TIT (*Parus britannicus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'73	× '48	— 23½	'72	× '5	— 24
'76	× '48	— 23½	'71	× '5	— 24
'7	× '5	— 22			

BLUE TIT (*Parus cæruleus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
·62	×	·45 — 17	·64	×	·45 — 17½
·61	×	·45 — 16½	·64	×	·45 — 17½
·64	×	·46 — 18	·58	×	·45 — 15½
·62	×	·45 — 17			

WREN (*Troglodytes parvulus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
·64	×	·49 — 20½	·64	×	·48 — 20
·65	×	·5 — 21½	·63	×	·49 — 19½
·65	×	·48 — 21	·62	×	·49 — 19½

GREY WAGTAIL (*Motacilla melanope*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
·78	×	·52 — 29½	·75	×	·52 — 28
·76	×	·54 — 29½	·75	×	·5 — 26

MEADOW PIPIT (*Anthus pratensis*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
·78	×	·6 — 34	·79	×	·6 — 35
·76	×	·57 — 32	·74	×	·57 — 32

SPOTTED FLYCATCHER (*Muscicapa grisola*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
·77	×	·55 — 32	·76	×	·54 — 30½
·77	×	·55 — 32½	·76	×	·55 — 31½

SWALLOW (*Hirundo rustica*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
·75	×	·54 — 29	·73	×	·53 — 28
·75	×	·55 — 30½	·76	×	·54 — 29½
·78	×	·54 — 30½			

SAND MARTIN (*Cotile riparia*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
·66	×	·49 — 21	·66	×	·48 — 21½
·66	×	·49 — 21	7	×	·47 — 21½
·67	×	·48 — 21½			

GREENFINCH (*Ligurinus chloris*).

Inch.		Inch.		Grains.		Inch.		Inch.		Grains.
·82	×	·53	—	32		·84	×	·54	—	34
·82	×	·54	—	32						

HOUSE SPARROW (*Passer domesticus*).

Inch.		Inch.		Grains.		Inch.		Inch.		Grains.
(a) .76	×	.58	—	36		(b) .85	×	.64	—	48
.76	×	.58	—	36½		.92	×	.58	—	45
.77	×	.56	—	35½		.8	×	.63	—	45
.77	×	.57	—	35½		.82	×	.6	—	39
.77	×	.58	—	37		.76	×	.57	—	34½

CHAFFINCH (*Fringilla cœlebs*).

Inch.		Inch.		Grains.		Inch.		Inch.		Grains.
(a) .72	×	.52	—	27		(b) .8	×	.56	—	33
.71	×	.53	—	27		.8	×	.56	—	33½
.73	×	.53	—	28½		.76	×	.56	—	31½
.7	×	.53	—	28		.76	×	.55	—	30

LESSER REDPOLL (*Linota rufescens*).

Inch.		Inch.		Grains.		Inch.		Inch.		Grains.
·64	×	·48	—	20		·64	×	·48	—	20
·64	×	·48	—	20½		·65	×	·48	—	20½
·64	×	·49	—	20½						

BULLFINCH (*Pyrrhula europæa*).

Inch.		Inch.		Grains.		Inch.		Inch.		Grains.
·75	×	·55	—	30 $\frac{1}{2}$		·79	×	·56	—	33 $\frac{1}{2}$
·77	×	·55	—	30		·8	×	·56	—	34 $\frac{1}{2}$
·79	×	·55	—	32 $\frac{1}{2}$		·82	×	·58	—	33

YELLOW BUNTING (*Emberiza citrinella*).

Inch.		Inch.		Grains.		Inch.		Inch.		Grains.
(a) .75	×	.62	—	39½		(b) .87	×	.65	—	49
.75	×	.62	—	39		.87	×	.65	—	49½
.77	×	.62	—	40½		.85	×	.65	—	49
.8	×	.63	—	42						

REED BUNTING (*Emberiza schoeniclus*).

Inch.		Inch.		Grains.		Inch.		Inch.		Grains.
·77	×	·57	—	33½		·76	×	·56	—	33½
·76	×	·58	—	34		·75	×	·56	—	31
·76	×	·56	—	33						

STARLING (*Sturnus vulgaris*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
(a) 1'22	× '8	— 104½	(b) 1'16	× '86	— 115½
1'15	× '82	— 103	1'1	× '88	— 112
1'14	× '83	— 105	1'1	× '88	— 112
1'1	× '84	— 104½	1'06	× '88	— 110
1'12	× '83	— 102			

MAGPIE (*Pica rustica*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
(a) 1'28	× '88	— 137	(b) 1'4	× '98	— 181
1'31	× '88	— 140½	1'43	× '98	— 181½
1'28	× '89	— 138½	1'43	× '96	— 164
1'31	× '88	— 140	1'4	× '98	— 177
1'28	× '86	— 132	1'4	× 1'0	— 180
			1'4	× '98	— 178
			1'46	× '96	— 179
			1'4	× 1'0	— 182

JACKDAW (*Corvus monedula*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1'36	× 1'02	— 3	1'36	× 1'06	— 200
1'38	× 1'04	— 194½	1'26	× 1'02	— 169
1'35	× 1'05	— 193½			

ROOK (*Corvus frugilegus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
(a) 1'76	× 1'02	— 225	(b) 1'66	× 1'4	Broken.
1'54	× 1'02	— 207	1'72	× 1'2	— 318½
1'56	× 1'05	— 225	1'76	× 1'16	— 317
1'48	× 1'05	— 218½	1'66	× 1'08	— 236
1'56	× 1'06	— 224½			

SKYLARK (*Alauda arvensis*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
'95	× '68	— 56	'95	× '68	— 55
'95	× '68	— 55½	'93	× '67	— 54½

SWIFT (*Cypselus apus*).

Inch.	Inch.	Grains.
1'0	× '62	— 51

NIGHTJAR (*Caprimulgus europæus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1'21	× '84	— 103½ ½ hatched.	1'14	× '88	— 111 ½ hatched.

CUCKOO (*Cuculus canorus*).

Inch.	Inch.	Grains.
·88	× ·65	— 51½

This egg was taken from MEADOW PIPIT'S Nest containing the following eggs:—

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
·80	× ·6	— 38½	·81	× ·59	— 37½
·83	× ·59	— 37½	·82	× ·6	— 39

LONG-EARED OWL (*Asio otis*).

Inch.	Inch.	Grains.
1·68	× 1·3	— 206 Almost hatched.

SPARROW HAWK (*Accipiter nisus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1·58	× 1·29	— 362½	1·6	× 1·3	— 369
1·59	× 1·27	— 349	1·63	× 1·28	— 364½

KESTREL (*Falco tinnunculus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1·54	× 1·22	— 314½	1·66	× 1·17	— 318½
1·58	× 1·22	— 319	1·6	× 1·25	— 326

CANADA GOOSE (*Bernicla canadensis*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
3·27	× 2·34	— 2217 Rotten.	3·27	× 2·35	— 2186 Rotten.

MALLARD (*Anas boscas*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
2·26	× 1·6	— 719 ¾ hatched.	2·24	× 1·63	— 767½ ¾ hatched.
2·22	× 1·65	— 779 do.	2·2	× 1·63	— 750 do.
2·3	× 1·62	— 765½ do.	2·26	× 1·62	— 761 do.
2·25	× 1·65	— 789 do.	2·2	× 1·65	— 764 do.
2·27	× 1·62	— 775½ do.	2·24	× 1·61	— 752 do.
2·24	× 1·6	— 724 do.	2·32	× 1·65	— 817½ Rotten.

RED-BREASTED MERGANSER (*Meergus serrator*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
2·6	× 1·75	— 1016 ¾ hatched.	2·66	× 1·74	— 1021 ¾ hatched.
2·7	× 1·75	— 1073½ do.	2·66	× 1·76	— 1085 do.
2·68	× 1·75	— 1059 do.	2·72	× 1·75	— 1084 do.
2·7	× 1·77	— 1093½ do.	2·52	× 1·78	— 1064 do.
2·74	× 1·74	— 1056 do.			

RING DOVE (*Columba palumbus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
(a) 1'56	× 1'15	— 294	(b) 1'66	× 1'18	— 324½
1'56	× 1'12	— 276			

RED GROUSE (*Lagopus scoticus*).

Inch.	Inch.	Grains.	
1'85	× 1'28	— 337	Rotten, and almost dried up.
1'87	× 1'25	— 316½	do.
1'84	× 1'27	— 329	do.
1'78	× 1'27	— 324	do.

PHEASANT (*Phasianus colchicus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1'74	× 1'41	— 472	1'76	× 1'42	— 483½
1'68	× 1'42	— 464	1'73	× 1'42	— 486½
1'75	× 1'44	— 492½	1'74	× 1'42	— 483
1'8	× 1'41	— 483½	1'62	× 1'43	— 452
1'62	× 1'42	— 470	1'78	× 1'45	— 511½

LAND RAIL (*Crex pratensis*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1'48	× 1'04	— 221	1'5	× 1'04	— 223½
1'54	× 1'02	— 226	1'5	× 1'05	— 228
1'5	× 1'05	— 223½	1'5	× '98	— 201

WATER RAIL (*Rallus aquaticus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1'4	× 1'02	— 194½	1'35	× 1'0	— 187½
1'37	× 1'0	— 185	1'4	× 1'0	— 187
1'4	× 1'0	— 191½	1'35	× '98	— 175½
1'37	× 1'0	— 188	1'38	× 1'0	— 187

MOORHEN (*Gallinula chloropus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
(a) 1'7	× 1'25	— 347	(b) 1'94	× 1'3	— 434
1'72	× 1'27	— 365½	1'82	× 1'3	— 417
1'66	× 1'27	— 359½	1'79	× 1'27	— 410
1'67	× 1'23	— 333			
1'75	× 1'22	— 333			
1'7	× 1'23	— 338			
1'68	× 1'25	— 347			
1'68	× 1'23	— 334			

COOT (*Fulica atra*).

Inch.	Inch.	Grains.		Inch.	Inch.	Grains.
2'05	× 1'42	—	564	Fresh.	2'02	× 1'4 — 515 ½ hatched.
2'12	× 1'42	—	561	do.	1'98	× 1'41 — 523½ do
1'98	× 1'42	—	533	do.	1'97	× 1'38 — 501 do.
2'04	× 1'44	—	537	½ hatched.	2'04	× 1'42 — 522½ do.
2'05	× 1'42	—	532½	do.	2'03	× 1'4 — 531½ do.

Above were all taken from one nest on same day.

LAPWING (*Vanellus vulgaris*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1'85	× 1'33	—	405½	1'88	× 1'31 — 406½
1'86	× 1'32	—	405½	1'95	× 1'31 — 412

OYSTER-CATCHER (*Haematopus ostralegus*).

Inch.	Inch.	Grains.	
2'3	× 1'57	—	651½ Almost hatched.
2'15	× 1'62	—	671 do.
2'25	× 1'56	—	635 do.

COMMON SNIPE (*Gallinago caelestis*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1'58	× 1'08	—	212	1'53	× 1'07 — 213
1'58	× 1'1	—	222	1'56	× 1'1 — 220

COMMON SANDPIPER (*Totanus hypoleucus*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1'48	× 1'04	—	191 ½ hatched.	1'48	× 1'05 — 190 ½ hatched.
1'5	× 1'06	—	203 do.	1'5	× 1'04 — 195½ do.

COMMON TERN (*Sterna fluviatilis*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1'74	× 1'18	—	316½	1'69	× 1'2 — 324½
1'71	× 1'2	—	322½		

ARCTIC TERN (*Sterna macrura*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1'65	× 1'2	—	310	1'6	× 1'18 — 300
1'65	× 1'18	—	305		

LITTLE GREBE (*Podiceps fluviatilis*).

Inch.	Inch.	Grains.	Inch.	Inch.	Grains.
1'55	× 1'0	—	201 ½ hatched.	1'56	× '98 — 194½ ½ hatched.
1'56	× 1'0	—	200½ do.	1'53	× 1'0 — 202 do.

Hillsborough, Co. Down.

INCREASE IN THE NUMBERS OF BREEDING
BIRDS IN MAYO AND SLIGO.

BY ROBERT WARREN.

A FEW notes on the great increase that has taken place within the last few years in numbers of some breeding birds in this district may be of interest to Irish ornithologists, for instance—Starlings, Rooks, Blackbirds, Shoveller Ducks, Shelldrakes, Common Gulls, and Arctic and Lesser Terns. The Starlings, though exceedingly numerous in winter, were very scarce in summer up to fifteen or twenty years ago, and it was most unusual to see even a pair or two flying about the district, and the only breeding-places I was then aware of were holes in some old trees in Castletown demesne; but since then the birds have spread all about the country, breeding in holes, in the gables and eaves of cottages and outhouses, and sometimes becoming quite a nuisance from the noise and dirt created by the young birds. To give some idea of their numbers, I may mention that along a stretch of about two miles of the road between Ballina and Enniscrone, twelve or fifteen pairs are found breeding—one pair at Moyfort, two pairs at Glen Lodge, two pairs at Upper Castlecomer, two pairs at Lower Castlecomer, a pair at Killanly Glebe, two pairs at Moyview, and two or three pairs at Scurmore, all in the Co. Sligo; then to cross the River Moy over to the Co. Mayo, we find that even on the Island of Bartragh several pairs breed, and one pair every season brings up *two* broods in a hole under the ridge tiles on Bartragh House, and destroys a great deal of small fruit in the Bartragh garden.

The Rooks have increased very much in this neighbourhood, and do an immense amount of damage to the farmers' corn and potatoes, attacking the latter as soon as the shoots appear on the surface of the ground, and, digging down to the sets, carry them off to eat at their leisure; then, again, when the young tubers are formed, a second attack begins, and great damage is done, more especially to early potatoes, which are more exposed to their attacks, as their foliage is not so dense as that of later kinds. To give one instance of the rapid increase of Rooks, I may state that up to 1880 no Rooks built here at Moyview, but now we have a rookery numbering a

couple of hundred nests. The beginning was very small, and commenced by a solitary pair. During the severe winter of 1878-1879 a number of Rooks frequented the farmyard, feeding with the pigs and fowl; then when the fair spring weather set in, most of them went off to their rookeries, but two pairs of weakly birds remained throughout the summer, still frequenting the farmyard, and also during the winter of 1879. Then when spring returned, the two pairs began building in old Magpies' nests in the trees near the yard; but after a time one pair deserted their nest and went away, but the other remained, and reared a brood of young ones. Next spring three pairs of Rooks had nests, and since then, year by year, the number of building birds have steadily increased, until, as I have already observed, at least 200 nests can be counted on the trees round the yard and house.

The Blackbirds have also increased until they have become a perfect nuisance from the damage they do the small fruit in the gardens, and also injure the thatched roofs of the cottages by digging holes in search of worms and grubs in the decayed portions of the roofs; and the amount of injury a couple of pair of Blackbirds will do to the roof of a cottage must be seen to be believed.

The Shoveller Duck was very scarce some few years ago, and when a specimen was shot on the lakes or estuary it was looked on quite as a rarity, but now they breed on many of the North Mayo lakes—on Loughs Conn, Lisduoge, Alick or Carramore, and Rathroeen, all situated within a three-mile radius of Ballina. Last June Mr. G. Scroope, of Ballina, found four or five nests with eggs on a small swampy bay on Lough Conn, and saw seven or eight old birds resting on the water close by. Some four or five years ago, when the late Mr. V. Jackson was flapper-shooting on the little lough at Carramore, out of six or seven brace of flappers obtained that day, two and a half brace were Shovellers.

Sheldrakes have also increased, and three or four pairs breed on the Bartragh sand-hills, and, perhaps, two pairs on those of Enniscrone across the Moy, while a pair generally breed in the rabbit-holes in one of my fields here at Moyview. In the summer of 1900 a pair brought out a clutch of fourteen young birds. They were constantly seen along the shore here

and on the water, and I was hoping that they would have been successfully reared, but out of the fourteen birds only *three* reached maturity, the others, before they were fledged, being shot by Sunday shooting parties coming down the river and estuary from Ballina; and although shooters on Sundays incur a penalty of £5, yet no notice is taken of them by the proper authorities in this part of the country.

The Common Gull has also extended its breeding range very much since 1855. The only breeding station then known to me was Lough Talt, a small lough in the Ox Mountains, in the Co. Sligo, about twelve miles from Ballina. Visiting the lough in May of that year, I met three pairs that had nests on a little rocky islet. I found three from which the young had flown—one with an addled egg—and saw several young gulls flying about. However, a year or two after, the gulls deserted the lough, in consequence of boats being placed on it for the convenience of trout-fishers. This was all I knew of the Common Gull's breeding haunts for many years after, until I was told of their breeding on a bog lough at Glenmore, near Crossmolina, Co. Mayo, but had no opportunity of verifying the statement until the 17th of May, 1882, when in the company of my friends, Dr. S. Darling and his brother, we visited the bog and found the gulls breeding. Odd pairs had nests on clumps, or rather islands of turf on small loughs, while the chief haunt was a small lough studded over with the stumps of trees, just over the surface of the water, on which eight pairs of gulls had nests. Since then the gulls have spread to Loughs Conn and Cullen (where none were to be seen fifteen years ago). Solitary pairs have nests on the stony points of many of the islands, and a colony of ten or fifteen pairs have nests on a small bushy island on Lough Cullen.

The Arctic Tern some years ago was almost unknown in Killala Bay, and I often, when visiting the Terns' breeding haunt on the Inch, a little gravelly islet near Killala, shot Terns, thinking they were the Arctic, but in every instance the specimens proved to be the Common Tern (*S. fluviatilis*), and it was not until May, 1877, that I got specimens of the Arctic Terns. I visited the breeding haunt on the Inch, near Killala, on 14th of June, 1895, and saw the Arctic in large

numbers, having nests scattered about the lands for fully half a mile along the range—many of them fully 150 yards from the water. They far outnumbered the Common Terns, which appeared to confine their breeding quarters to the gravelly Inch, and as far as I saw were the only terns that made any attempt to make a nest—the Arctic laying their eggs on the bare sand and gravel.

The Lesser Tern has increased more in proportion to its former numbers than the Arctic, ten or twelve pairs every year breeding on the Inch, sometimes less; but in June, 1895, when visiting the Inch and the Ross sands, I was surprised at their numbers; fully sixty or seventy pairs had spread all over the Inch and adjoining Ross sands, and even had crossed the channel to the end of Bartragh, where four pairs had eggs just above high-water mark on the loose sands. Again, on the 13th of June, 1899, I visited the breeding haunt, and found both Lesser and Arctic Terns as numerous as in 1895, and after very close observation again came to the conclusion that the few Common Terns still kept to the Inch, leaving the wide expanse of Ross sands to the Arctic and Lesser Terns. Although the Terns were in such large numbers, the nests were not numerous in any one place, but were thinly scattered about the wide expanse of sand.

Moyview, Ballina.

NOTES.

BOTANY.

The International Catalogue of Scientific Literature.

The first fruits of this great undertaking have appeared in the shape of two volumes (Section D, Chemistry, and Section M, Botany), in which are catalogued all the books, papers, and notes dealing with these sciences published during the year 1901. The entries are alphabetized under authors, and subsequently under subjects. Opening the Botany volume at random, we find under *Ireland* that of a list of 37 communications dealing with the flora of this country, 28 were published in this Journal. From the balance, however, two items must be deducted, as by a strange oversight two notes dealing with the flora of Louth in Lincolnshire have been included in the Irish section. The annual issue of these volumes will greatly facilitate scientific reference, and will render it much more easy for the naturalist to keep pace with the ever-increasing bibliography of his subject.

ZOOLOGY.

Bryophila muralis in County Cork.

When lately in the Cork district I found the remains of pupæ and larvæ in cocoons in the walls of Fort Westmoreland (Spike Island) and Fort Carlisle, which undoubtedly were those of *Bryophila muralis*. No imagines were seen, as I was late for their emergence. The larval cocoons or nests were not very numerous, but I mention the fact to show that the species is to be found in many parts of the district round Cork and Queenstown, the only localities I recorded in the Catalogue of Irish Lepidoptera. It is unfortunate that a long series of the insect from Cork is still a desideratum in the National Museum. Mr. Westropp tells me he took a few at Monkstown (Cork) this year, a place where I captured a single specimen myself many years since. Captain Donovan has lately added Courtmacsherry, in the same county, to the list of Irish habitats.

W. F. DE V. KANE.

Monaghan.

Cœcilianella acicula in Co. Kilkenny.

On 9th April, while turning over some stones on top of a gravel mound, about two miles south of Ballyraggett, I observed a specimen of *C. acicula* attached to a stone. I would not have noticed it had I not been looking closely at specimens a few days previously in the Dublin Museum. About half a mile away I found another among gravel. On reaching home I studied the geological map and saw that these gravel heaps were evidently magnesian limestone deposits, and marked several other places on the map where these deposits were to be found, with the result that on the 11th I found a few more specimens in a quarry about 1 mile south of Kilkenny, and later on I took others at $1\frac{1}{2}$ miles and $5\frac{1}{2}$ miles from Kilkenny, on the Dublin road. In all I found about fifteen of these; five or six were alive, the rest empty shells. I have very little time at my disposal, and only searched by turning over stones or gravel; I did not dig in any of these places. There are several patches of dolomite or magnesian limestone deposits in the neighbourhood of Johnstown and Urlingford, and also one or two in South Kilkenny that I hope at a future time to prospect, and firmly believe that these shells may not be nearly so rare as supposed, though they are not easy to detect.

P. H. GRIERSON.

Youghal.

Hawfinch breeding at Straffan, Co. Kildare.

Mr. Bedford called here on July 28 and informed me that he observed this bird feeding its young on the island near Straffan House this year for the first time, although he has noticed the old birds about the grounds there for some years. He also told me that amongst other stone fruits on which they feed with avidity is the exotic *Cotoneaster Simonsii*, of which they seem particularly fond.

F. W. BURBIDGE.

Trin. Coll. Botanic Gardens, Dublin.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a pair of St. Helena Finches from Mrs. Cannon, a Heron from Mr. R. R. Fitzherbert, a Lizard from Mr. L. C. Doran, a Hare from Mr. B. Kilmurray, a pair of Peregrine Falcons from Mr. R. M. Barrington, three Choughs from Mr. P. D. Butler, a Chacma Baboon from Mr. A. E. Goodbody, a Cockatoo from Mrs. Pritchard Rayner, three Pea-fowl from the Dowager Marchioness of Dufferin, a South African Squirrel from Mrs. Fletcher, two Green Monkeys and a Kestrel from Mr. H. St. George, a Zebra from the Zoological Society of London, four Hog Deer from Capt. A. R. Pryce, a white Turkey-cock from Sir Douglas Brooke, and a Mongoose from Colour-Sergeant W. J. Grace. A Malayan Bear, two Porcupines, and a nest of the Meadow Ant (*Lasius flavus*) have been bought.

BELFAST NATURALISTS' FIELD CLUB.

JULY 26.—The half-day excursion to Giants' Ring did not take place.

AUGUST 16. EXCURSION TO MONKSTOWN AND BALLYCLARE.—Twenty-six members left from the Linenhall Library, and drove by the Shore Road to the ivy-clad ruins of Whiteabbey, all that remains of the abbey founded for White Canons, which was an offshoot from the Abbey of Dryburgh, in Scotland. Ascending the slopes of the Knockagh, the members visited the ruins of Monkstown Abbey, the reputed burial-place of King Fergus.

At Monkstown a formal meeting of the members was held, under the chairmanship of Mr. W. H. Phillips. One of the members gave a short address on the historical associations of the place, and announced the further arrangements for the day. Proceeding a few miles further, a visit was paid to Lisnalincha Fort, an excellent example of the early Celtic earthen fortifications. The rath around the circular lis and the outside fosse are still in fair condition, and well worth preserving.

The next halt was at an ancient monument known as Wiley's Fort, a circular earthwork of about eighty paces in diameter. The encircling rath has been levelled, but part of the fosse remains. This fort has connected with it a souterrain, which is not now accessible, and from the number of stones scattered over the surface it is to be feared that the structure has been damaged, if not entirely destroyed. It is to be regretted that so many of our interesting old Irish monuments are allowed to fall into dilapidation.

As to the botany of the district passed over so quickly, there was not as much variety as might have been expected; nevertheless, several of the less common plants were collected. *Briza media* was found at Monkstown and at Ballyclare. *Peplis Portula* was grown plentifully in the ditch at Lisnalinchy Fort. *Alchemilla filicaulis* was met with at Wiley's Fort, and with it *Trifolium medium*. At Ballyclare *Barbarea intermedia* was gathered by the river bank.

A halt was made at Baird's Hotel, Ballyclare, to prepare for the return journey. No more appropriate place could be selected, with its quaint garden of strange shrubs and flowers, fantastic summer-houses, quiet nooks, rustic seats, decorative figures, and antiquarian objects. Attendants, attired in ancient Irish costume, marched in silence to and fro, bringing up a succession of geological and antiquarian objects—stone, bronze, and iron weapons illustrative of pre-historic and mediæval times, and thus furnished the members with ample materials for examination and discussion during their stay. From Ballyclare the members returned to Belfast by the Antrim Road, and thus completed a most enjoyable day's outing.

DUBLIN NATURALISTS' FIELD CLUB.

JUNE 21.—THE EXCURSION TO WICKLOW, announced on the programme for this date, did not take place.

AUGUST 23. EXCURSION TO KILCOCK.—On this date a small party of members left Dublin by the midday train. The morning had been rather threatening, but those who went enjoyed a fine afternoon, working back along the Royal Canal bank to Maynooth. A number of the local canal-side plants were gathered, such as *Cœnanthe fistulosa*, &c. The insects taken include the beetle *Corylophus cassidioides*, making a third Irish record for this species, and the best finds amongst the aquatic species were *Haliphus confinis* and *Gyrinus opacus*. The water bug, *Corixa Bonsdorffi*, which it was thought might occur in this locality, proved to be quite a common species. The water-net brought up an abundance of the smaller aquatic animals, amongst these being some interesting species of water-mites, such as *Arrenurus ornatus*, George; *A. maculator*, Muller; *A. tricuspidator*, Muller, and *A. crenatus*, Koenike, this last being previously unrecorded as a British species. Several examples of the true water-spider, *Argyroneta aquatica*, were captured; it is known to inhabit the canal in other places. After partaking of tea at Maynooth, the party returned to Dublin by the afternoon train, well pleased with their ramble.

THE BRITISH ASSOCIATION IN BELFAST.

THE Belfast meeting of the British Association for the Advancement of Science has come and gone, and "a right good meeting" is the verdict of most of those who attended it. In reporting the proceedings in this Journal, the subjects falling within the scope of the *Irish Naturalist* are specially dealt with, and it has not been possible, in the space at our disposal, to refer to the work of Sections devoted to other than natural science, or to give abstracts of papers except where they bear on the fauna, flora, or geology of Ireland. For information given, or contributions supplied to the pages which follow, the Editors' best thanks are due to the following gentlemen:—George Coffey, Prof. Grenville Cole, J. H. Davies, W. J. Fennell, William Gray, Rev. Canon Lett, Robert Patterson, G. H. Pethybridge, J. St. J. Phillips, R. F. Scharff, H. J. Seymour, Rev. C. H. Waddell, and R. Welch. The excellent reports in the Belfast Press have also helped to fill some gaps in the narrative.

FORMER MEETINGS IN BELFAST.

ON seven occasions has the British Association for the Advancement of Science met in Ireland—in Dublin in 1835, 1857, and 1878; Belfast in 1852, 1874, and 1902; and Cork in 1843. In 1852 Belfast was a town of only some hundred thousand inhabitants, without large public halls or much hotel accommodation. May-street Presbyterian Church was utilized for the President's address (attended, by the way, by the then Lord Lieutenant and a brilliant gathering) and the other general meetings, while Messrs. Workman's lately erected

warerooms were the scene of the two soirées, which appear to have been thoroughly enjoyed by the 1,108 members and associates. One of the two evening discourses delivered in May-street Church was by Col. Portlock on "The recent discovery of Rock-Salt at Carrickfergus." Col. (afterwards Lieut.-General) Sabine was President, and among the Presidents of Sections were such distinguished Irish men of science as Andrews, Portlock, and Whately. Irish natural history was well represented in the Sections. Among the readers of geological papers we find Andrews, Bryce, Forbes, Griffith, Grainger, Jukes, King, MacAdam, M'Coy, Salter, and Young; in biology, Balfour, Dickie, and Allman contributed papers on the Irish flora, and Allman, Dickie, Forbes, Grainger, and Hyndman on local zoology. We note also that three out of fourteen Reports of Researches in Science came from Ireland, and two out of eleven grants in aid of research went to Irish committees.

In 1878 the population of Belfast had nearly doubled itself since the former meeting, and the great Ulster Hall was available for Tyndall's famous Presidential Address, and the lectures and soirées that succeeded it. Among the Presidents of Sections we note the names of Jellett, Hull, Redfern, O'Hagan, and James Thomson. The increase of attendance at the meeting was proportionate to the growth of the town, the roll including 1,951 names. Irish geology was again well represented in Section C, papers being submitted by Grainger, Hardman, Harkness, Hull, G. H. Kinahan, Langtry, James Thomson, W. A. Traill, and Joseph Wright. In the Biological Section, S. A. Stewart contributed to the botanical programme, and Macalister to the zoological, while William Archer read papers in both departments. Two local papers read in the Engineering Section received the honour of being ordered to be printed *in extenso* in the Report; namely—T. R. Salmond on Belfast Harbour, and J. Smith, jun., on the Upper Bann.

It is interesting to note, in connection with the work which the readers of this Journal have at heart, that the number of papers dealing with Irish natural history contributed to the three Belfast meetings has been almost identical, notwithstanding the great changes which have taken place in the half century which they cover. The figures are as follows:—

	1852	1874.	1902.
Geology, . . .	11	12	14*
Botany, . . .	3	3	3
Zoology, . . .	4	2	3
	18	17	20

* Including four papers in the Geographical Section.

INCEPTION OF THE 1902 MEETING.

THE President of the British Association stated in his address at Belfast:—"A great man has observed that intelligent anticipation of events before they occur is a factor of some importance in human affairs. One may suppose that intelligent anticipation had something to do with the choice of Belfast as the meeting-place of the British Association this year." The "intelligent anticipation" of the Belfast Meeting in 1902 was first entertained by the Belfast Naturalists' Field Club, who appointed a Provisional Committee on 10th December, 1897, consisting of the President, Secretaries, and Messrs. Swanston, Vinycomb and Gray, to take the initial steps towards the issuing of an invitation. The Belfast Natural History and Philosophical Society took the matter up later, and the movement assumed definite form at the influential Town Meeting held in the City Hall on September 9th, 1899, from which a deputation was sent to Dover to invite the British Association to Belfast, an invitation that was formally accepted at Bradford in September, 1900.

PREPARATIONS FOR THE MEETING.

LOCAL WORK.

As at the previous meeting, the Queen's College formed a spacious headquarters. The handsome Examination Hall made an ideal reception-room, and in the class-rooms, &c., all the Sections found accommodation, with the exception of three, which were housed in the Methodist College, Elmwood Church Hall, and Assembly's College respectively, all being

within five minutes' walk of the reception-room. The distance of the Association's headquarters from the centre of the city and the hotels was an inconvenience hardly felt, owing to a much appreciated concession made by the Belfast Street Tramways Company, who presented each Member and Associate with a free pass over their entire system, available during the period of the meeting. The bulk of the visitors were accommodated in hotels and lodgings. The response to the Local Committee's invitation as to offering hospitality was not so general as had been anticipated, and in this and other respects a certain lack of practical interest in the visit of the Association was shown by the general public of Belfast. On the other hand, the work done by the Local Committee and its officers, and the enthusiastic co-operation of many local scientific men, combined to render the meeting the great success which it undoubtedly was. The three Local Secretaries Professor Fitzgerald, John Brown, F.R.S., and G. W. Ferguson, with their assistant, A. H. Muir, worked hard to meet the varied demands made upon them. In getting together and arranging the temporary Museum in the Anthropological Department, Professor Symington and R. Welch performed a laborious and most useful piece of work, which was very highly appreciated by the visitors; while as Secretaries of Sections or conductors of excursions, many of the leading Field Club members, including William Gray, W. J. Fennell, Rev. C. H. Waddell, H. J. Seymour, J. St. J. Phillips, and Robert Patterson, were conspicuously useful. But in this connection also there was an unequal response to the Association's summons, and certain leading officials of local scientific societies were conspicuous chiefly by their absence.

PUBLICATIONS.

The most important local publication in connection with the meetings of the British Association is always the "Handbook," prepared each year by the Local Committee or persons delegated by them, and giving a general and scientific account of the district in which the meeting is held. In the case of the Belfast meeting this work was very properly handed over to the Belfast Naturalists' Field Club, who have such a long

record of excellent work carried out in the North-east of Ireland. The "Handbook" which the Club turned out is one of the best of its kind which we have seen—concise, handy, and well illustrated. As the publication of a work of the sort is an important step in the progress of natural history in the North, we give at a subsequent page a critical notice of the book.

The booklet—for it is much more than an illustrated programme of the excursion—prepared by W. J. Fennell for the Gobbins excursion, came as a pleasing surprise to many, and was in much demand subsequently as a souvenir.

The programme of local arrangements and other official literature was very well turned out, and was much superior to that which have done service at certain former meetings.

EXHIBITS.

A conspicuous feature of the meeting was the Temporary Museum got together in the Anthropological Section. This was organised by Dr. Symington, Professor of Anatomy and Registrar, Queen's College, who had the well-lighted dissecting-room cleared out, re-painted and fitted with dust-proof glass-top cases, with the Anatomical Museum wall and table-cases also cleared out, and special labels and cards prepared. These were well filled by exhibits illustrating papers read at various Sections, mainly those at Section H (Anthropology), and in addition by various ethnographic and archæological, &c., exhibits connected with the North of Ireland, collected by Dr. Symington and R. Welch, who assisted him as Museum Steward for the meeting. The exhibits were accompanied by descriptive labels, each exhibitor being responsible for the accuracy of his own notes.

EXHIBITS:—W. J. KNOWLES*, celts in various stages of manufacture from the recently discovered prehistoric "celt factory" near Cushendall, typical Ulster flint arrow-heads, spear-heads, &c., and some "plateau" implements from Antrim and Kent. Rev. Dr. BUICK, a large series of rude flint implements, cores, flakes, &c., from the raised beach at Larne. W. H. PATTERSON, rude pottery (fragmentary), bones, worked flints and flakes from prehistoric settlements on the coasts of Down, Antrim, and Donegal. S. F. MILLIGAN, stone and bronze celts, worked flints, and

* Exhibits marked with an asterisk were connected with papers or reports read at the Meeting.

miscellaneous exhibits of local interest. W. A. GREEN and R. MAY, old rushlight holders, cruises, &c., and the latter a "witch's stone" used quite recently over the door of an Antrim farm-house to keep witches and evil spirits away. (This was placed over the door of Section H for the same purpose!) R. YOUNG, a local series of flint flakes and scrapers, &c. R. M. YOUNG,* various finds from a kitchen midden, Co. Down. Sir R. LL. PATTERSON, autographs of the Red Lion Club at the 1852 Belfast meeting, given to the late Robert Patterson, F.R.S. Dr. SYMINGTON,* human skull with a 4th molar tooth, and a large series of human skulls cut and measured by the late John Grattan for his work on Craniology, with a copy of that work and plates from same. Dr. SCHARFF,* bones and teeth from the Keishcorran caves, Co. Sligo. TRINITY COLLEGE, skeleton of Cornelius Magrath, the Irish giant. Miss ANDREWS and Dr. LETTS, the late Professor Andrews' original apparatus for liquefaction of gases, &c. R. BELL, bricks made from diatomaceous earth (a small peasant industry on the Lower Bann), rush crosses. F. J. BIGGER, straw cross. Miss DAVIS and Rev. J. O'LAVERY, old Irish harps. W. J. FENNEL,* measured drawings of some Ulster souterrains. Rev. G. MEEHAN, straw mask and skirt used by Co. Leitrim "straw boys" at wedding dances. R. WELCH, straw mask from Belmullet, model curach (Sheephaven type), cra-hooks and bog-fir rope from west Donegal, shell necklaces from Bundoran, and framed sets of photographs connected with Ulster ethnography and archaeology. J. J. PHILLIPS, drawings of abbeys, Diocese of Down. J. BROWN, viagraph and patent wheel. B. D. WISE, model of the Gobbins lattice girder bridge. S. ROY, miscellaneous exhibits. The B. and N. C. Rly. Co., B. and C. D. Rly. Co., Gt. N. Rly. Co., and M. G. W. Rly. Co., framed sets of photographs illustrating the five official and some extra excursions. E. LOVETT,* tally sticks of various trades, British and foreign. T. STEELE,* marsupial embryos and *Peripatus* from Australia (a very fine set). W. HANNA, the Cobra and Black Viper of India, mounted to show difference in fangs. Dr. A. HENRY,* objects illustrating his paper on the Lolos of China. T. N. ANNANDALE,* photographs of natives of the Malay Peninsula. F. T. ELWORTHY,* perforated stone amulets. The National Collection of Geological Photographs were also removed here on the last two days by Prof. W. W. WATTS*. In the quadrangle, Messrs WISE and WELCH exhibited several of the old slide, clog wheel and spoke-wheel cars, some stages in the evolution of the modern cart and jaunting-car. These attracted much attention, as so very few people were aware of the survival of these old vehicles in the north-east of Ireland. H. A. MATIER exhibited the old Irish wooden plough still used in light soils in the kingdom of Mourne.

In Section G Professor Fitzgerald had collected together a large number of framed photographs, &c., connected with

* Exhibits marked with an asterisk were connected with papers or reports read at the Meeting.

some of the principal Belfast industries, lent by Messrs. HARLAND and WOLFF, Ltd., COMBE BARBOUR, WORKMAN and CLARKE, Ltd., RICHARDSON SONS and OWDEN, Ltd., and WM. EWART and SONS, Ltd., the latter of whom exhibited flax in various stages of manufacture.

A number of geological exhibits were shown in a room adjoining the lecture hall at Section C:—R. BELL, series of Cretaceous fossils from local rocks. Madame CHRISTEN, specimens of local and other glacial erratics. J. J. H. TEALL, F.R.S., new drift map of the Dublin area. A. R. DWERRY-HOUSE, model illustrating his paper on the underground waters of Yorkshire. J. St. J. PHILLIPS, set of local rocks illustrating basalts and rhyolites of Co. Antrim; also specimens of copper-pyrites, galena, and pyromorphite from Conlig lead mines, Co. Down. H. J. SEYMOUR, series of rock specimens illustrating the igneous geology of the neighbourhood of Carlingford. Prof. W. W. WATTS, the national collection (additions, 1902) of geological photographs. R. WELCH, series of geological photographs of the North of Ireland, mounted in form suitable for educational purposes. A. T. METCALFE, some geological photographs.

In the Botanical Section the leading exhibit was a set of dried specimens illustrating the rarer species of Flowering Plants found in the district, contributed by S. A. STEWART and R. LLOYD PRAEGER. To this collection Rev. C. H. WADDELL added some rare local Brambles, and Nathaniel CARROTHERS fresh specimens of *Equisetum trachyodon*. A large series of Australian plants, beautifully preserved, and illustrating especially the genus *Eucalyptus*, was shown by Mr. Thomas STEELE; and Mr. James STIRLING also showed Australian plants, including Mosses, etc. Prof. BALFOUR exhibited flowers of forms of *Erica Tetralix*, grown in Edinburgh Botanic Garden, and beautifully mounted in glass.

In connection with the meeting of the Association, a great deal of much needed work was done at the Natural History collections in the Museum in College Square North, by a band of volunteers, including Robert Patterson, William Swanston, Rev. W. F. Johnson, N. H. Foster, John Cottney, H. L. Orr, and R. Welch. The collections of Irish fossils and rock-specimens were cleaned, re-mounted, and re-labelled. A

splendid set of foraminifera arranged by Joseph Wright was exhibited. The collection of Irish birds was entirely remodelled, 180 new specimens being added, many from the collections of Sir R. L. Patterson and Robert Patterson, and a set of maps provided showing the distribution of each species. The egg collection was similarly entirely overhauled, and clutches were presented by R. J. Ussher, N. H. Foster, and John Cottney. This collection now contains examples of the eggs of every Irish breeding bird. Among the insects, what is practically a new collection of Irish beetles has been formed, consisting of many thousands of specimens representing 1,150 species. The Belfast Natural History and Philosophical Society is to be congratulated on being favoured with the services of so devoted a band of naturalists.

PROCEEDINGS OF THE ASSOCIATION.

THE PRESIDENTIAL ADDRESS.

PUNCTUALLY at 8.30 on the evening of September 10th, the formal business of the Association was opened with the usual large gathering of fully "dressed" members. The Ulster Hall being unfortunately not available, the meeting was held in the Grosvenor Hall. Did the assembly know that the bright array of banners of past-Presidents might not have been there to adorn the scene but for the courageous act of a local clergyman, who, when the area of the Hall had, in the previous week, been several feet under water, "divested himself of some of his clothing," and plunged in to rescue the precious emblems from a drowning table? The farewell words of Principal Rucker, in resigning the Chair of the Association to Professor Dewar, were perfect both in inception and delivery. Professor Dewar's address dealt for the most part with those results in physical science—the approach towards the "absolute zero" and the liquefaction of gases—that have made his name famous. Possibly the address might have been more effective if these abstruse subjects had been dealt with early, and the inevitable references to the progress

of Belfast, the great Tyndallian pronouncement of '74, and the need of systematic scientific education for the British and Irish people, postponed to revive the flagging attention of the members towards the close. As it was, the concluding paragraphs were delivered to a rapidly-decreasing audience. The passages relating to scientific education served as an excellent introduction to the subsequent deliberations of Section L, and the President's generalization—that we lag behind the Germans, not in the inferiority of our great men, but in the want of training for our “rank and file”—may be taken to heart by naturalists as well as by physicists and chemists.

THE EVENING LECTURES.

Professor J. J. Thomson's lecture on Becquerel Rays (12th September) is quite beyond the scope of this Magazine, but we may at least pay a just tribute to the beautifully lucid way in which a very difficult subject was expounded. But for the unfortunate failure of one or two experiments, the lecture would have been almost perfect.

Professor Weldon's discourse (15th September) was an exposition of the statistical method applied to the phenomena of Inheritance. As an example of ease and power in handling an abstruse and intricate subject, the lecture could not fail to impress the audience, but we fear that few, excepting the highly-trained mathematicians present, were able to grasp the principles underlying Professor Weldon's researches. The subject was beyond the capacity of the rank and file of the Association in spite of the lecturer's ability and eloquence.

Professor Miall's lecture to artizans on Gnats and Mosquitoes was a model of clear and simple teaching. The chief points of the gnat's life-history, and of the relation between gnats and malarial parasites, were brought home with just enough illustration to fix the wonderful history in the minds of the hearers, whose attention throughout was intense. Not to the Belfast artizans only, but to any science teachers fortunate enough to be present, the lecture was in the highest sense educational. Perhaps the Members of the Association wish that the authorities would not consider their receptivity so much greater than that of the “artizans.”

THE DELEGATES' CONFERENCE.

The Conference of Delegates of Corresponding Societies and Sections of the Association appears to have been full of life, and practical suggestions of useful work to be carried out by local Natural History Societies and Field Clubs abounded. The Conference met on two days, and the interest was well maintained. Much of the work suggested was of a nature eminently suited to our Irish Field Clubs, and we trust will be brought under their notice. In this connection we learn with amazement that the Belfast Club, which, through its delegate, has taken an active part in this Conference for many years, was not represented at the meetings held in its own city! Neither, we are informed, was the Belfast Natural History and Philosophical Society represented, but the fact that their chosen delegate was one of the Local Secretaries of the Association explains, though it hardly excuses, the non-representation of that influential body. H. J. Seymour, representing the Dublin Field Club, alone upheld the cause of Irish science. As to the Belfast Field Club, the Committee would have done better to retain as delegate the member who has served them so long and so well in that capacity.

The annual meeting of delegates to the Association appointed by local societies was held at the Queen's College on September 11th and 16th, Professor W. W. WATTS, Birmingham, presiding. On the first day the Chairman, in the course of an introductory address, dwelt on the importance of local Societies, such as Naturalists' Field Clubs, and urged the desirability of these organisations keeping in touch with one another, so that united work might be the result. Research work should be the great aim of these Societies, and that conference he described as the nerves of the body of the general Association. He also urged on local societies to preserve their publications, and instanced the *Irish Naturalist* as a conspicuous success for many years past. Societies, he thought, should exercise great care in the matter of handing over to town and county councils local museums, which, in many cases, contained collections of considerable local interest.

Dr. GARSON, Assistant General Secretary to the Association, presented the report of the Corresponding Societies' Committee. He pointed out that there was great remissness on the part of secretaries of local Societies in making the necessary reports to the Association. Last year there were seven delegates who had made no reports at all to their Societies. This was a very serious matter, and should be taken

up earnestly by local Societies at once. Dr Garson concluded by impressing on delegates the great importance of research work, which at present, he said, was very badly done.

A discussion was then opened by Mr J. F. TOCHER, delegate of the Buchan Field Club, on "The desirability of a Pigmentation Survey of School Children in Ireland." He explained, in some considerable detail, the aims and objects of the proposed survey, and gave an account of the methods to be adopted, and also his experience in the practical investigation in this direction which he had carried out in various parts of Scotland.

The next subject discussed was brought forward by Mr. C. H. READ, of the Ethnographical Department of the British Museum, and was "A plea for an Ordnance Map Index of Prehistoric Remains." The desirability of commencing such a survey was pointed out; and reference made to works of this character which had already been produced in a few isolated localities. The chief difficulties appeared to consist (1) in obtaining cash for a necessarily expensive work (publication, etc.), and (2) in coming to an agreement as to the conventional signs to be adopted to represent the various classes of prehistoric remains. It was agreed that the above difficulties should not be considered as at all insurmountable.

On the second occasion of the meeting, besides the delegates from the various Corresponding Societies, there were present also representatives (one for each Section) of the various Sections of the Association. These came to confer with the delegates, and to explain how the various Natural History Societies throughout the country could assist in some of the researches being carried on by the Sections, by collecting statistics, or forming local committees to carry out research work on similar lines, but not necessarily of so intricate a character. These delegates from the Sections of the Association made valuable suggestions as to the work which the various local Societies could carry out with advantage to themselves and to science. The suggestions made, as will be seen below, were very varied in character, but all were eminently practical, and, so far as Irish Field Clubs are concerned, ought to replace the list of subjects for which prizes are offered by several of our Clubs and Societies. The work done at the Conference of Delegates will be detailed later on before the Dublin Naturalists' Field Club, by its representative, who happened to be the only delegate from Irish Societies present at the meetings, though three Irish Societies were on the list. In the meantime, it seems advisable to mention briefly the numerous suggestions brought to the notice of the delegates by the representatives of the various Sections and some others of those present.

Dr. LETTS (Section B) first drew attention to the remarks made by Professor Dewar regarding the training of chemists, and hoped that some of those present would obtain statistics showing what training chemists employed in chemical or other manufactories in this country had received to fit them for the posts which they now occupy. The

great importance of this inquiry was emphasized by quotations showing how much higher, on the average, was the training and qualifications of the German chemists, the result being the capture by the latter of lucrative chemical industries which were actually first made possible by discoveries in this country.

Attention was then called to the phenomena of fluorescence and phosphorescence exhibited by diamonds, and it was suggested that an investigation into these problems might be carried out with the aid of one's own or one's friends' diamonds. The latter appeared to be chiefly suggested as necessitating less risk (personally). An appeal was also made for the collecting of statistics to find out the behaviour of the seaweed *Ulva latissima* under certain circumstances, especially in sewage-polluted and non-polluted areas, and generally an investigation on the special functions of certain algæ.

Section C—Suggestions of a geological character were made by Messrs. KENDALL, LOMAS, WOODWARD, and WATTS. The first-named referred to the Erratic Blocks Committee of the British Association, and said that in Ireland, with the exception of Counties Antrim and Down, practically no research was being carried out on the distribution of erratics. He offered to send to any Society interested in the question a type collection of well-authenticated specimens to aid their researches. Mr. LOMAS spoke on the Trias Committee, and pointed out that Trias fossils were not systematically looked for. He asked, also, for photos of foot-prints on slabs of Trias sandstones, with a view to determine the horizon of the foot-print beds.

Mr. WOODWARD referred to the necessity for the registration of type fossils and figured specimens, and Prof. WATTS spoke on the desirability of investigating the flow of underground waters.

Professor WATTS also drew attention to the Geological Photographs Committee of the Association, and mentioned that in Ireland a large number of counties are yet unrepresented by photographs illustrating local geology. Amongst such counties should be mentioned Wicklow, Wexford and Waterford, Westmeath, Longford, King's and Queen's Counties, Kildare, Kilkenny, Carlow, Roscommon, Leitrim, Monaghan, and Tyrone. He urged on the local Societies the great desirability of securing photographs of such sections as may be only temporarily exposed.

Section D—The representative of Section D. referred to a paper read in that Section dealing with the different markings which appear on fish scales according to the age of the fish, and suggested an investigation of this character as suitable for members of local Societies. Reference was also made to the fact that protective mimicry is not uncommon amongst many insects of our own fauna, and that cases of this kind require detailed investigation and description.

Mr. BLES showed some schedules adopted by the Cambridge Entomological and Natural History Society, with a view to the recording thereon of the observations made by local naturalists. He spoke on

the merits of the scheme, and its usefulness in obtaining all kinds of information on natural history subjects.

Section E—Dr. H. R. MILL asked that members of local Societies should make and record observations on any variations in the forms and courses of lakes and rivers which may come under their notice. He also urged that rain-fall observations should be carried out, by means of rain-gauges. A large number of observers is necessary to check results, and also to establish the period of the supposed cycles of rain-fall, whether eleven years or thirty-five years. Its high value in connection with the utilisation of water-power was commented on, and it was mentioned that observations of less than thirty years cannot be relied on to give accurate information in this particular economic problem.

The suggestions made by Sections F and G hardly come within the scope of Field Club work, and need not be referred to here.

Mr. COFFEY, from Section H, referred to the question of the protection of ancient monuments, some of which have quite recently been broken up for road-metal by contractors. The desirability of creating public interest in the matter was urged. Mr. Coffey also suggested that experiments should be carried out on a large scale to establish what nature can do in the way of producing flint-chips, some of which appear to resemble closely the rude forms referred to human agencies.

Mr. BEVAN urged the desirability of a systematic archæological survey of the kingdom, county by county, and asked the assistance of members of local societies.

Section K asked for help and assistance from natural history photographers in obtaining good pictures of interesting plants and of plant associations.

THE SECTIONAL MEETINGS.

In this magazine we can only concern ourselves specially with those Sections—Geology, Zoology, Botany, Geography, and Anthropology, that can be considered as pertaining to natural science. Taking the Association as a whole, there can be no doubt that the popular Sections were Economics and Education. It is not for us to discuss the many problems that were raised, especially in Section L. We would only express an earnest hope that the attention paid to scientific education in the meetings may bear fruit in an increased scientific interest throughout the country, and that when next the Association visits Ireland, we may not have to deplore any lack of local support. The discussions of Section L, were transferred at the close of the meeting to Dublin, where, in Alexandra College (dare we write that most enlightened of our educational institutions?), a conference on the teaching of natural science in schools was held under the presidency of Professor Howes,

WORK IN THE NATURAL HISTORY SECTIONS.

SECTION C—GEOLOGY.

The work of the Geological Section (C) was carried out with undoubted briskness. The excellent lantern arrangements rendered illustration easy and effective, and the numerous field-excursions in the afternoons gave visitors a clear idea of the geology of Belfast. Some papers of great geological interest, like that by Mr. James Porter on the Cork valleys, found their way into the Geographical Section ; and few of the active geologists could manage to attend also in another section. The presidency of Lieut.-Gen. C. A. MacMahon, F.R.S., was marked by certain heroic qualities, as he was recovering from a street accident, and his eyesight had also recently become affected. Notwithstanding, he was regularly at his post, and the Vice-presidents were but little called on. Some of the most successful papers were those in which colonial districts were described ; but, as usual, the Section preserved a decidedly professional character, and the papers and discussions reminded one of the meetings of the Geological Society of London. Whether this is entirely desirable in a body whose object is to stimulate scientific tastes in the locality in which it meets is a question for the organisers of each Section.

SECTION D—ZOOLOGY.

The meetings of Section D attracted a goodly company of zoologists to support Professor Howes, who most ably presided over their deliberations. His address, entitled the "Morphological Method and Progress," abounded in brilliant passages, which, whether acceptable to all his hearers or not—he ran a-tilt at the Okapi, and expressed his belief that *Limulus* is *not* an Arachnid—always provided food for thought. His concluding reference to the work of William Thompson must have delighted Uister naturalists. Only on two occasions was the Section crowded—on Friday, 12th September, when Professor Herdman gave a very interesting account of his adventures in Ceylon while investigating pearl-fisheries ; and on Wednesday, 17th, when a spirited discussion on natural

selection in relation to mimicry and protective coloration was opened by Professor E. B. Poulton. Many of the papers dealt with various problems of bionomics, and comparatively few were too technical to be beyond the capacity of the average Association member.

SECTION E—GEOGRAPHY.

In the Geographical Section a wide range of subjects was under discussion. It is not surprising to find that the vast extent of ground covered by the term "geography" results in a frequent overlapping in the work of this and other Sections. Thus, the programme included geological subjects, such as "World-shaking earthquakes" and "Charnwood Forest, a buried Triassic landscape"; zoological, like "The rate of formation of coral"; botanical, such as "Geographical Plant-groups in the Irish flora"; or economic, like "Colonisation and irrigation in British East Africa." Geography *per se* has not many adherents, and hence the attendance at the Section fluctuated greatly, earthquakes and Antarctic exploration drawing a bumper house, while at other times the attenuation of the audience reached an extreme limit.

SECTION H—ANTHROPOLOGY.

Next to Section A (Mathematical and Physical Science), Section H showed the biggest programme, with forty-five items on the list; and in sitting for five days it was accompanied by Zoology and Botany alone. The address of the President (Dr. A. C. Haddon) on Totemism was a useful summarizing of the present position of an important subject, and the speaker's personal acquaintance with savage tribes and their customs lent additional weight to his remarks. Among the archæological papers, Hon. John Abercromby's paper on the oldest Bronze Age ceramic type in Britain represented a very important piece of work, correlating the early pottery of Britain and the Continent, and laying the foundation of ceramic chronology in our countries. Mr. Coffey's paper on the Hallstatt style in Ireland performed a similar useful function for another type of early remains. Irish archæology was indeed well to the fore, with contri-

butions from W. J. Knowles, G. Coffey, W. J. Fennell, Sidney Hartland, P. J. O'Reilly; Mr. Knowles' find of a celt factory near Cushendall is excellent, the site being the best of its kind yet discovered in the British Islands. The Secretary of the Belfast Natural History and Philosophical Society (who, by the way, was conspicuous by his absence during the entire period of the meeting) sent in a paper to which we refer elsewhere. In other departments of work, Professor Cunningham's account of Cornelius Magrath, with remarks on giants in general, attracted a large and interested audience, while Dr. Graham's analysis of the Ulster character gave rise to discussion which still splutters intermittently in the local press. Dr. Symington gave a special demonstration in the Anatomical Museum on craniology, with special reference to John Grattan's work. Reviewing generally the work of the Section, the programme was ample and varied; the proceedings were not hurried, and good time was allowed for discussion; but it may be suggested that if more attention could be given to the discussion of problems of anthropology, the usefulness of the sectional work might be increased; papers on original research are more advantageously studied when printed, and there are plenty of Societies ready to undertake their publication.

SECTION K—BOTANY.

Perhaps the most striking feature in the Botanical Section was the limited nature of the discussions called forth by the papers read. This must have been especially disappointing to the member, who, confessing to not having read up the literature of the subject of his paper, explained that his reason for bringing it before the Section was in the hope of *gaining*, rather than giving information. Even this somewhat novel appeal failed to move the hearts of the members, but doubtless when the author has some information worth giving he will get his *quid pro quo* in the shape of virile discussion from which he will be the gainer. The lack of discussion is probably partly explained by the fact to which the President called attention in his opening Address, namely, the largeness of the botanical field. Those workers who are ploughing their own lonely furrows have got so deep in them that they no longer

feel themselves competent to criticise those of others, or able to make a general survey of the whole field of labour. This may be true, and yet the gap between the morphologist and the physiologist is supposed to be less wide than in the old days. But what shall be said of the gap between the extreme field botanist and the pure laboratory man? Surely the former must soon cease publishing lists of all the spots in his parish where groundsel grows; when will the latter condescend to come down from his stool and study the plant as a living organism with a history and an environment in the field? What a meeting ground here for the physiologist, the morphologist, and the field botanist, aye, and the meteorologist and the geologist too, if they care to climb over the hedges of their own strict preserves! As regards general interest and novelty, Professor Bose's splendid demonstration of electric response to stimulation in plants probably stands first. The highest number of papers was claimed by physiology, morphology (including anatomy) coming next along with fossil botany, followed by distribution and lastly by pathology.

ABSTRACTS OF PAPERS BEARING ON IRISH NATURAL HISTORY.

SECTION C.—GEOLOGY.

THE GEOLOGY OF THE COUNTRY IN THE NEIGHBOURHOOD OF BELFAST.

BY PROFESSOR G. A. J. COLE, F.G.S.

The paper summarised the work of Portlock, Tate, Hume, Swanston, Wright, Praeger, and others, including the officers of the Geological Survey, in elucidating the geological history of the district. McHenry's correlation of the Mourne granite with the interbasaltic eruptions of rhyolite in County Antrim was referred to. The main interest of the area for geologists lies in the preservation of Mesozoic formations, elsewhere almost lost in Ireland, and in the volcanic and terrestrial Eocene deposits, which contrast so interestingly with the marine and estuarine Eocene of south-eastern England. The paper was illustrated by a number of effective lantern slides, including many by Mr. Welch and Mr. J. St. J. Phillips.

ON THE MARINE FAUNA OF THE BOULDER CLAY.

BY JOSEPH WRIGHT, F.G.S.

He had examined microscopically 112 samples of Boulder clay from various places in the British Isles and in Canada; 47 of these were from Ireland, 27 from England and Wales, 22 from Scotland, 1 from the Isle of Man, and 14 from Canada. In 71 of the British and 9 of the Canadian samples Foraminifera were found. The specimens of the clay had been taken from various altitudes, some few of them from localities over 1,000 feet above the sea. Almost all the forms found were referable to species which at present lived at moderate depths off our coast, and most of them had the fresh appearance of these species. *Nonionina depressula* was often met with in great profusion, fully one-half of the entire specimens found being referable to this species. One hundred and thirteen species had been found in the clays of Ireland, 72 of those in the Isle of Man, 66 in England and Wales, 40 in Scotland, and 15 in Canada. In 31 of the gatherings no Foraminifera were met with, whilst in some of the others they were very rare. The absence or the scarcity of specimens in some of the samples might be due, in part at least, to the circumstances that it was only the first floatings from the clays that were examined, and also that these minute organisms were liable at times to be overlooked when the material was being examined. To ascertain how far floatings could be relied on for giving conclusive results, 1oz. troy of the Boulder clay from Woodburn, near Carrickfergus, was examined with the utmost care. The first floating was found to contain 1,400 specimens, the floating process being repeated twenty-five times before specimens ceased to come up; upwards of 600 additional specimens were thus obtained. What remained of the clay was then examined in detail with the microscope, and 67 more specimens were got from it. In the Boulder clay at Knock Glen, near Belfast, 79 species were obtained, many of them being very rare forms, 6 being only known as recent British species from collections on the west coast of Ireland, two of these also occurring off the west coast of Scotland. The presence of these microzoa would lead them to infer that the clay at this place was probably deposited in deep water, when the land stood at a much lower level than at present, and when the marine conditions must have been somewhat similar to what now prevails off the west coast of Ireland. At Woodburn, near Carrickfergus, the clay was very similar to that at the Knock Glen, being very fine and comparatively free from stones. Here also three of the west of Ireland foraminifera occurred, also an exceptionally large specimen of *Cornuspira involvens*. It was many diameters larger than any specimen seen by the author from recent British gatherings. In size it closely resembled an allied form of *Cornuspira carinata*, taken in dredgings off the west of Ireland. Some of these west of Ireland forms have also been found in Boulder clay at other places. *Lagena fimbriata* was found at five other localities besides those of Knock and Woodburn, one of these being at Larch Hill, County Dublin, 800 feet above the sea, and *Polystomella subnodosa* was got in Ayrshire at 1,071 feet elevation.

Mr. G. W. LAMPLUGH said they were all under a deep debt of gratitude to Mr. Wright for his address with reference to the organisms of the Boulder clay. They knew how devoted he was in his work, and if they did not quite agree with his conclusion it did not diminish their appreciation of his labours in that field of inquiry. With this statement he would go on to criticise. Mr Wright's conclusions were that the Boulder clay beds were marine because of the presence of the little organisms they contained. In his view Boulder clay was not in the strict sense of the term sediment; it was rehash of beds already in existence. They had the Boulder clay in this neighbourhood made up largely of the characteristic rock over which the breaking-up agency passed, and they must expect to find in it the same class of organisms. The general study of the drifts showed them that Boulder clay was derived from the action of an ice sheet. Some of the areas referred to by Mr. Wright as instances in support of his theory came within the area of the work of the Geological Survey last year, and in the Dublin beds wherever they found shells they also found fragments of Ailsa Craig eurite. They were only beginning with the Belfast area, but already they had come across similar phenomena. On the top of Divis Mountain, the Belfast Naturalists' Field Club had found a fragment of Ailsa Craig eurite, where Mr. Wright had discovered traces of Foraminifera. The other evidence of the glaciation of this region one could scarcely find time to refer to, but the main point he would make was that the arrangement of the drifts was incompatible with the marine theory. The body of evidence in favour of the glacial origin of these deposits was so weighty that they need not hesitate to accept it.

Prof. W. BOYD DAWKINS said Mr. Wright had drifted into a very complicated and extremely important question. He quite disagreed with Mr. Lamplugh. It was for him much easier to believe that clay containing marine materials had been accumulated under marine conditions than to imagine that it had been deposited on the land from melting ice. There were several difficulties in the way of the land ice theory. The first that had to be met was the motive force. Where did the vast field of ice get its motive force from so that it could override elevations up to 1,300 feet? It seemed to him there was no evidence of any such motive power that could bring ice all the distance from Scandinavia to Ireland. The next difficulty was if the glaciation was from the sea to the land then the land would be glaciated from the sea. But that was not what they found; they found that the conformation of the rocks showed glaciation from the higher to the lower levels. This difficulty so far had never been grappled with by any one belonging to the land glaciation school. Then the organisms were as perfect as they could be, Would this be so if they were to suppose that such delicate things as those were fished up from the bottom of seas and carried by the stupendous impact of masses of ice to the elevation of 2,000 feet? He was not one who shared the views of the younger school of geologists and chipped away the views of Lyell and others as of no account.

Prof. P. F. KENDALL (Yorkshire College) said a challenge had been given on that subject year after year, and were it not that Professor Dawkins had gone out to attend another meeting, he would have seen it fought out to the end. Marine organisms were always found in the Boulder clay associated with transmarine erratics. This was the one thing in favour of the glacial origin of the Boulder clay, but a weightier argument was the fact that in those beds they found fragments of various formations, which could not possibly have been there had they been a later marine deposit.

Mr. H. W. MONCKTON wished to know if such delicate fossils as the organisms found in Boulder clay could travel long distances without being damaged.

Mr. LOMAS said it was more reasonable to believe that the Boulder clay was an ice deposit than to believe that it was formed by marine action.

A member of the audience replied to Mr. Monckton's question. He said in the mammal beds near Cambridge he had got Chalk Foraminifera which were in excellent condition, although they had been denuded from the surrounding hills. Mr. WILLIAM GRAY said those were siliceous Foraminifera. The member who had given the reply did not think Mr. Gray was right. Mr. WRIGHT briefly replied, maintaining the view he had taken in his paper.

REPORT OF THE COMMITTEE¹ APPOINTED TO EXPLORE IRISH CAVES.

This Report, illustrated by lantern slides, was brought before the Section by Mr. R. J. USSHER.

IN 1901, the Committee directed their energies to exploring a series of caves situated on the slope of Keishcorran Mountain, fifteen miles south of Sligo. The caves occur along the foot of a range of low cliffs, with a steep talus below them. The first cave explored (Coffey cave) showed a surface layer with remains of Red Deer and of man similar to those found in raths and crannogs, under which was a breccia with bones of small mammals, among which the Arctic Lemming, hitherto unknown as an Irish species, was abundant. This bed overlay clay which also yielded bones of Lemming. A second cave (Plunkett cave) was dug; the upper stratum yielded a stone celt, iron saw, two bronze pins, mussel and oyster shells, and abundant remains of domestic animals; also a metatarsus of Reindeer, associated with charcoal, and many bones of Brown Bear and Frog. Under this was a thick bed of clay, almost devoid of remains of domestic animals, but full of Brown Bear remains, with Fox, Red Deer, Rabbit, Wolf, and Lemming, Frog and Field-

¹ Dr. SCHARFF (Chairman), R. L. L. PRAEGER, G. COFFEY, Prof. COLE, Prof. CUNNINGHAM, G. W. LAMPLUGH, A. MCHENRY, and R. J. USSHER.

mouse. The clay became yellow, tenacious, and barren in the deeper excavations.

After reading the report on the Keish Caves, Mr. Ussher stated that the work of the Committee had been carried on during the summer of 1902 at Edenvale, Co. Clare, where he had been occupied for eleven weeks in excavating two separate systems of caves. These had proved to be very prolific in relics of man and of extinct animals. The former included, besides human bones, scrapers of flint, bone awls or pins, amulets, bracelets of metal, an amber bead, and iron knives, and a bronze strap and buckle, with interlaced design in silver. Bones of various domestic animals were abundant, and there were some marine shells. Bones and teeth of Reindeer and Bear were abundant, and some of the latter had belonged to gigantic individuals, while Irish Elk was represented in a few instances. The group of caves last explored forms a complex group, now called the "Catacombs," and has been only partially excavated.

In the discussion that followed, Dr. SCHARFF mentioned that the most remarkable of the remains discovered at Keish were those of the Arctic Lemming, which still inhabits Greenland and the Arctic Regions generally. The Stoat remains consisted of a fragment of a jaw, which was of interest in being smaller than that of the living Irish Stoat. The Horse remains were all very small, belonging to a race resembling the Shetland Pony in size, while the Ox-bones found were mostly about the size of bones of Kerry cattle. Altogether the animal remains were of much zoological interest, and added to our knowledge of the domestic animals kept by the early Irish races of men.

Dr. HENRY WOODWARD thought the Committee had taken in hand a most useful work, and wished the members all success in the future. To judge by the discovery of the Lemming, many other surprises might be in store. He hoped that the Association's grant to the Committee would be renewed.

ON THE MINERALS KNOWN TO OCCUR IN IRELAND.

BY HENRY J. SEYMOUR, F.G.S.

The paper dealt with the previous literature of the subject, and commented on the fact that the last published complete list of Irish minerals was brought out in 1868, and was merely an appendix to a list from other localities in Great Britain. The want of an up-to-date and authenticated record of what is at present known about Irish minerals had been, the author believed, accountable for the neglected state of this interesting study in Ireland, and was certainly accountable for the fact that several times "new finds" had been put on record of minerals discovered twenty years before. By means of a personal examination of collections of minerals in Museums and in private collections in this country the author has verified at present the occurrence of some 115 distinct species. This number is to be regarded as of a preliminary nature only, and the author is satisfied that his further researches into the matter will result in a considerable addition to the above total.

THE SILURIANS OF NORTH EAST IRELAND
AND THEIR CHARACTERISTIC FOSSILS.

BY R. CLARK.

Within the past four years revised maps on the one-inch scale have been published by the Geological Survey of the country stretching north from the Boyne to Belfast Lough, and westward into the Counties Monaghan and Cavan. The greater portion of this area is of Silurian age, and on the old editions of the Survey Maps issued many years ago the beds were in general classed as "Lower Silurian." Subsequent investigations into the fauna of the Silurians, especially the labours of Messrs. Lapworth and Swanston, increased very considerably the knowledge hitherto existing, and rendered it desirable that a detailed division of these beds should be undertaken. To obtain a key to the various zones the abundant fauna of Coalpit Bay, Co. Down, was further investigated with very satisfactory results, which materially aided the revision in other localities, and allowed of its being carried out in detail.

It was most interesting to note at widely distant localities the regularity with which the sequence of the Coalpit Bay section was repeated, and the various bands from the *Diplograptus palmeus* of the Upper Llandovery to the cherty radiolarian seam of the Lower Caradoc again and again met with. In the course of the author's researches fossils were procured at numerous hitherto unknown localities, and in districts previously considered barren of palæontological evidence. This was especially so over a large portion of Co. Armagh, from which a large collection of typical Lower Caradoc and Llandeilo Graptolites was made, and again in the Clogher Head area of Co. Louth, where a fine series of *Monograptus* similar to those at Portaferry, Co. Down, showed the beds to be of Upper Llandovery age, and not Llandeilo as they had been supposed to be. The occurrence of species new to this country is interesting, and the discovery of *Rastrites maximus*, the absence of which had been commented on by Professor Lapworth, was gratifying. A dichotomous plant, *Berwynia Carruthersi*, was found at Coalpit Bay in Lower Llandovery.

THE DRIFT MAP OF THE DUBLIN AREA.

BY J. J. H. TEALL, F.R.S.

The new map of the Drifts or surface deposits of the Dublin area (sheet 112), is the outcome of the combined work of the field staff of the Geological Survey of Ireland during last year. A copy of the map was exhibited, and it was pointed out that this constituted the first colour-printed map produced by the Survey. The colour scheme adopted to represent the 9 or 10 classes into which it was found possible to divide the Drifts was briefly explained, and the relative ages of the different divisions was pointed out. Some new and hitherto unexplained physical

features of the district, such as the "Dry Gaps," were described in some detail, and it was also mentioned that the general characteristics of the soil produced by the various drifts were indicated in an index printed at the margin of the map. Finally the very valuable help and advice given by Colonel Haynes, Director of the Ordnance Survey of Ireland, under whose direction the map was produced in colour-printing at the Phoenix Park Office, were gratefully acknowledged.

INVESTIGATIONS INTO THE GLACIAL DRIFTS
OF THE NORTH-EAST OF IRELAND,
CONDUCTED BY THE NATURALISTS' FIELD CLUB.

BY MADAME CHRISTEN.

The schedules exhibited have been prepared as the most important results of several years' work carried on by many members of the Belfast Naturalists' Field Club, and include stray records from localities not fully examined, which have nevertheless furnished data sufficiently important to be worth recording. They will elucidate the short account of local glacial geology which appears in the Handbook prepared for the visit of the British Association. Further details will be subsequently published in the Club's annual *Proceedings*. ERRATICS—The prevalence of Ailsa Craig eurite is remarkable. It occurs at twenty-six of the scheduled localities—as pebbles on the sands at Whitepark Bay, Portrush, and Portstewart, on the shores of Belfast Lough, and in the dredgings off Rathlin Island at a depth of forty-five fathoms. Scottish rocks have been found in several deposits, and others whose parent locality may be either Scotland or Ireland. Basalts and other rocks, too widely distributed as rocks in the district to be of value in indicating lines of ice-flow, have been omitted from the schedules for the sake of conciseness; nor has it been possible in these limits to include the compass direction of parent rocks, which will be more easily understood by reference to the accompany map, where the distribution of a few easily-recognised erratics has been indicated. The term "loose stony drift" is here applied to localities where the contents of Boulder clay cliffs have been scattered on the shore by the waves of the sea, as well as to loose drift which is dispersed over headlands and mountains. No. 27 (Carrowreagh quarry offers a solitary example of a peculiar pebbly deposit of angular fragments. Shells are very rarely found in the Drift of this District, but microzoa, especially Foraminifera, are widely distributed. Their occurrence in such elevated deposits as No. 4 (Divis Mountain) and No. 7 (M'Art's Fort, Cave Hill), and their absence from such a deposit as No. 32 (Killough) at sea level, is noteworthy. The Boulder clays at No. 4 and No. 7 are not a typical deposit, being scanty beds of hard clay filled with angular fragments of chalk, flint, and basalt only. The invasion of the north-east of Ireland by an ice-flow from Scotland, the ensuing conflict between Irish and Scottish ice, and the ultimate lines of distribution over Ireland offer a fascinating problem barely touched upon in

these researches, and urgently call for further investigations of the Drift deposits scattered throughout Ulster.

The CHAIRMAN said they should return thanks to Madame Christen and to the Belfast Naturalists' Field Club for their work.

Mr. LAMPLUGH said they were mapping the drifts of the Belfast area. Before he came north he had not studied the *Proceedings* of the Belfast Naturalists' Field Club as much as he ought to have done. Some admirable collections had been registered by the Club.

ON THE GEOLOGICAL STRUCTURE OF IRELAND.

BY PROF. G. A. J. COLE, F.G.S.

Prof. Cole pointed out the more prominent phases of the geological history of Ireland, mainly as an explanation of the existing scenic features of the country, and expressed the opinion that probably very little remained in Ireland of the old Huronian continent, unless portions of it had appeared again in the cores of Caledonian folds. The stratified but metamorphosed Dalradians of the west might be Cambrian or older. The gneiss of the ancient moorland between Omagh and Cookstown was, moreover, very possibly pre-Cambrian. The Silurian sea must have covered all the Irish area; and the subsequent Caledonian folding, with its axis running north-east and south-west, marked out the first distinct lines of the existing country. The arches became filled with molten rock as they rose, and denudation had again and again exposed in them a core of granite. To this folding we owed the guiding lines of Donegal, Sligo, and Mayo; the axis of Newry; and, above all, the Leinster Chain. The granites weathered into round-backed moorlands; the schistose foothills gave rise to picturesque ridges and ravines upon their flanks. In the Dublin area, between the foothills and the sea, quartzites and slates, usually regarded as Cambrian, had added the prominent features of Howth, Bray Head, and the two Sugarloaves, to an already diversified landscape. The Old Red Sandstone lakes spread across the hollows of the Caledonian continent, to be succeeded by the inflow of the Carboniferous sea. The Lower Carboniferous beach-deposits were now found on the summits of west Irish mountains, and very little of the country could have escaped submergence. The Hercynian folding produced the second series of structural lines, assisted by the varying resistance of the Old Red Sandstone and the Carboniferous limestone to denudation. The great limestone plain itself was probably to be looked on as a vast shallow synclinal of the same epoch, into which, in later periods, the Caledonian and Hercynian ridges poured down their detritus. The terrestrial conditions of the British Trias were continued into the Irish area, but the surviving beds of this period all lay north of Dublin. The Rhætic sea penetrated as far west as the Caledonian hills of Londonderry, and marine conditions continued during early Liassic times. An uplift then probably occurred, and the sea did not return till the middle of the Cretaceous period. The "white limestone," which formed so distinctive a feature of the Antrim coast, represented the English

chalk. The great feature of the north was, however, due to volcanic eruptions of Eocene age. Owing to the immense outpouring of basalt across the uplifted Cretaceous and earlier strata, the Counties of Antrim and Londonderry include high igneous plateaux. The granite of the Mourne Mountains was intruded in the same period of unrest, and the pinnacles and rocky walls of the group were a sign of youth when compared with the older granite areas in Ireland. The existing surface of northern Ireland was determined by the falling-in and dislocation of the volcanic country that once spread northward to the Faroe Isles. Lough Neagh thus lay in a shallow basin formed during this epoch of subsidence and decay. The long sea-inlets of the north and west originated about the same time; but Ireland, now cut off from the lost continent on the north-west, became joined on to the growing continent of Cainozoic Europe. The spread of ice in glacial times was marked by numerous hills of gravel and eskers, especially in the central plain, where they form green ridges rising from the bogland and the prairie. The oscillations of level between the glacial epoch and the present day finally left Ireland cut off from Scotland, Wales, and England, with which her fundamental geological structure so obviously connected her. It was interesting to note that the most prominent features of her landscapes at the present day depended on structures impressed upon the area far back in Palæozoic times. The paper was illustrated by lantern views mainly by Mr. R. Welch, of Belfast, and Mr. Lawrence, of Dublin.

The CHAIRMAN said they had to thank Professor Cole for his interesting lecture. It was a great advantage to those who had not studied the geology of Ireland specially, that they should have it sketched and presented so clearly.

ON THE PROLONGATION OF THE HIGHLAND BORDER ROCKS INTO CO. TYRONE.

BY G. BARROW.

The subject was introduced by a brief account of the jasper and green rock series occurring along the southern margin of the Highlands in Kincardineshire. The author then proceeded to note the other occurrences along the Southern Highland border, and to speak of the similarity to these of the rocks of Anglesey and North Wales. The evidence as to the age of these rocks was referred to, and marking their widespread outcrop near Pomeroy, he showed that they bore the same relation to the Highland rocks as those in Kincardineshire; that was to say, the two series were separated by a persistent thrust plane. This had been previously traced by Mr. M'Henry, though his work was not published. The metamorphism of the series by granitic intrusions was briefly outlined, and the age of the various groups was discussed. Taking into account the evidence from different areas, the author concluded that the Highland rocks were the oldest, and were of Archæan age. The jasper and green rock series, though newer, was most probably of pre-

Cambrian age, and not Silurian, as he had formerly supposed. Those conclusions in the main agreed with the views put forward by Mr. Kinahan, to whom the credit of assigning a pre-Cambrian age to these green rocks was primarily due.

Mr. M'HENRY said he agreed to the three divisions—Old Red Sandstone rocks, green rocks, and fossiliferous Silurian rocks. The Pomeroy rocks were mapped as Lower Silurian, but contained, he believed, Wenlock and Devonian fossils, with a few survivors of the Bala type. Pebbles of the green rocks occurred in the Pomeroy conglomerates. All the green rocks were igneous, except a few baked sediments and chert beds. The line between the schists and the green rocks was a great thrust, which, in his opinion, affected the Old Red Sandstone also. He had followed the thrust south-west as far as Clare Island. The oldest series, in his opinion, was mainly equivalent to the Llandeilo and Bala beds.

Dr. MATLEY said in Anglesey the two older series were distinct, and the Arenig contained fragments of the green rocks, showing these to be at any rate not Upper Silurian.

Professor COLE said in the central district of Tyrone there were two granites, one of which had made the central zone of gneisses. The gneisses below the green rocks were probably pre-Cambrian. Some of the quartzites and cherts of the west of Ireland might be Silurian, but the evidence was against all the Dalradians being Silurian, as Mr. M'Henry desired to prove.

Mr. TEALL said he agreed that the disturbance was really to be classed with that which Mr. Barrow had worked out in Forfarshire, and the author of the paper must be right in claiming it as one of the most important disturbances in the British Islands. With regard to Mr. Barrow's views as to the age of the rocks, he had nothing to say; yet he felt that it was a subject that would have to be considered most carefully. He thought they should hesitate before they classed the jasper and the green rocks as of one age. With Professor Cole's remarks concerning the way in which those questions of age should be determined he thoroughly agreed. It would only be by close and careful work. They could not sweep all Dalradian rocks into the Silurian merely on some local bit of evidence. He concurred that chert presented itself in abundance in the Torridon sandstone, and therefore that there were cherts in formation in pre-Cambrian times.

Professor WATTS said he had found true Radiolarian chert pebbles in Ireland, but had not been able to trace them to their source of origin.

Professor BLAKE criticised the paper generally. He was impressed with the necessity of detailed work in the classification of the rocks under discussion. If anything revealed that necessity surely it was the difference of opinion that existed between the author of the paper and some of those who had spoken upon it. Great stress was laid by Mr. M'Henry on the nature of the fossils found in the different formations, but he considered that the mixing of fossils alleged in such cases was largely existent in the imaginations of those who had not worked out the stratigraphical problem.

Mr. CUNNINGHAM CRAIG asked if the thrust really affected the Old Red Sandstone, and what its actual age was.

Mr. BARROW, in replying, said the movement was undoubtedly lower than any part of the Old Red Sandstone. Movements of the kind were progressive, and as one came further away from the centre where they had started they gradually became of a newer age.

THE POST-GLACIAL DEPOSITS OF THE BELFAST DISTRICT.

BY R. LLOYD PRAEGER.

The silted-up head of Belfast Lough and other similar places in the district display a remarkably fine series of deposits, extending from the close of the glacial epoch to the present day, with a rich fauna, from which much of the history of the intervening period may be gleaned. A typical section at Belfast shows the following sequence:—

	Feet.	Inches.
Surface clays,	6	6
Yellow sand,	2	0
Blue clay { Upper,	6	0
{ Lower,	6	0
Grey sand,	2	0
Peat,	1	6
Grey sand,	2	0
Red sand,	4	0
Boulder clay (base not reached),	15	0
	<hr/>	
	45	0

The peat bed, which at Belfast is twenty feet below low-water level, reappears between tides at various other places in the district. It represents an old land surface, and its fossils include the "Irish Elk." The blue clay is the most important bed of the series. Two divisions can be clearly distinguished in it, the lower clay being littoral, and characterised by such shells as *Scrobicularia piperata*, the upper yielding an abundant fauna pertaining to five or ten fathoms of water; *Thracia convexa* is a characteristic fossil. In both clays some of the bivalves occur in beds, each shell in its natural position, and many of the species attain remarkably large proportions. In places the *Scrobicularia* clay is overlaid by raised beaches. Thus at Larne twenty feet of stratified gravels, containing marine shells and neolithic implements throughout, replace the *Thracia* clay, and serve to date it. The fauna of the *Thracia* clay has a distinctly southern aspect when compared with the present fauna. As regards oscillations of level, the peat proves a level higher than the present in certain places by at least thirty feet. Subsidence, irregular both as regards rate and area affected, superseded to the extent of fifty to eighty feet; the final elevation, which brought about the existing state of things, amounted to thirty or forty feet. As regards climate, the northern fauna of the glacial period appears to have passed away by the time the peat was formed. Southern species immigrated till the

molluscan fauna acquired a distinctly southern character in the upper blue clay. Then the seas became again colder, and the present local molluscan fauna has a distinctly northern aspect.

The Chairman (Dr. HENRY WOODWARD) asked Mr. Praeger if he had found any of the peculiar nuts with calcified kernels, such as the specimens found in Belfast Lough and now in the British Museum, and whether any collection of the shells which he had mentioned was to be seen in Belfast.

Mr. LAMPLUGH spoke in high praise of the work Mr. Praeger had done, and said it was so thorough there remained no more to be done in that special direction.

Professor PERCY KENDALL, of the Yorkshire College, Leeds, said he hoped much from Mr. Praeger's work when the full record of it was published, and asked certain questions as to the level of the strata.

Mr. PRAEGER, in reply, said he had in his possession some of the nuts to which the Chairman referred. All the facts as to levels Professor Kendall would find in the *Proceedings* of the Belfast Naturalists' Field Club and of the Royal Irish Academy. A good collection of the shells of the blue clay was to be seen in the Belfast Museum, College Square.

SECTION D.—ZOOLOGY.

SOME REMARKS ON THE ATLANTIS PROBLEM.

BY R. F. SCHARFF, PH.D.

Since the dawn of early history the question of the existence of a continent beyond the "pillars of Hercules" has occupied the mind of man. Our very earliest records of this mythical land were derived from a narrative which has been handed down to us by Plato.

The Atlantis problem, however, was only raised to scientific importance when modern research revealed the fact that the living as well as the extinct flora and fauna of Europe have quite a number of types in common with North America. Unger was the first to put forward the view, from a purely scientific reasoning, that the Atlantic Islands, that is to say, the Azores, Madeira, and Canary Islands, formed part of the land-connection which stretched right across the Atlantic and still preserved some of the plants which invaded our continent from the New World. Heer hailed this hypothesis with delight, while Andrew Murray adopted it in a somewhat modified form. Edward Forbes also occupied his fertile mind with the problem, but could not convince himself that the vast land which had evidently occupied a portion of the Atlantic had any connection with America. Wollaston, too, who had a most intimate knowledge of the Atlantic Islands, strongly supported the view that their fauna reached them across dry land.

Imbued, however, with the idea of the permanence of the great ocean basins, Wallace vigorously attacked one and all of these theories, and contended that there was not only no connection between Europe and America across the Atlantic, but that the fauna of the Atlantic Islands

was derived from the adjoining continents of Europe and Africa by winds and hurricanes. The weight of the arguments brought forward by Wallace silenced all critics for a time, and the influence of his views is traceable in most of the more recent writings on the subject. But since some leading geologists have expressed themselves against the theory of the permanence of the great ocean basins, the older views of a possible land-connection between Europe and the Atlantic Islands, and also between Europe and America, are again discussed. The author has, therefore, collected together a number of facts in the distribution of animals which had not hitherto been utilised, in order to make a renewed attempt from a zoological point of view to solve the Atlantis problem.

The results of these investigations tend to show that Madeira and the Azores are the remains of an ancient Tertiary area of land which was joined to Europe, and that it probably became disconnected in Miocene times. Since then this land once more became united with our continent, and may not have been finally severed until the Pleistocene period. As regards the question of a land-bridge across the Atlantic, many reasons can be given in favour of such a theory. It must, however, have occupied a position farther south than the land just alluded to. Uniting North Africa with Brazil and Guiana in early Tertiary times, it probably subsided during the Miocene period, leaving only a few isolated peaks as islands in the midst of the vast ocean which has since replaced it.

Prof. POULTON, in opening the discussion on this paper, reminded the Section that the doctrine of the permanence of ocean basins originated not with Wallace but with Darwin, whose conclusion seemed unshaken by the facts brought forward by Dr. Scharff and those whom he had quoted. Our knowledge of distribution in most groups was still too imperfect to warrant us in creating continents.

Prof. DENDY followed on the same side, and thought that the American element in the fauna of the Canaries might be explained by chance carriage of organisms by the Gulf Stream.

Mr. CARPENTER believed that the admitted imperfection of our knowledge could not invalidate the positive distributional facts cited by Dr. Scharff, and considered that the number of correspondences now known could not be explained by any theory of chance introduction by winds and currents, pointing out that some of the most characteristic animals common to Europe and the Atlantic Islands, such as the slugs of the genus *Testacella*, live deep underground.

Dr. STANLEY GARDINER dwelt on the fact that the flora and fauna of coral islands must be carried to them by currents.

Prof. WELDON thought that there was much weight in Dr. Scharff's contentions, since the living Molluscan fauna of the Atlantic Islands shows a close likeness to the Continental Miocene fauna.

Dr. SCHARFF, in reply, instanced the case of the British operculate mollusc *Cyclostoma*—an animal specially adapted for spreading its range by means of water-carriage. Yet, although dead shells are frequently being washed on the Irish coast, the animal has never been able to establish itself here.

ON THE INSECT FAUNA OF SOME IRISH CAVES.

BY GEO. H. CARPENTER, B.SC.

Only a few of the numerous caves in the limestone districts of Ireland have as yet been searched carefully for a living fauna, but these have already yielded results of considerable interest. The communication dealt with the Springtails (Collembola) that have been discovered in the Mitchelstown Cave, near Cahir, Co. Tipperary, and in the Dunmore Cave, near Kilkenny.

An exploration of the former cave in 1857, by Haliday and Wright, resulted in the discovery of many specimens of a white blind springtail that was doubtfully identified with the Carniolan cave species, *Lipuna stilicidii*, Schiodte. This insect is now known to be identical with the widespread *L. inermis*, Tullberg, a species that inhabits both caves and the upper world in many parts of Europe and North America. All the species of this genus, whether in caves or above ground, are destitute of eyes.

All the Irish caves seem to be inhabited by *Tomocerus tridentiferus*, Tullberg, and in this species pigment and eyes appear to be always well developed.

Heteromurus margaritatus, Wankel (= *Templetonia cavernicola*, Carpenter), a pale blind species, inhabits both Mitchelstown and Dunmore caves. This form is widespread in the Continental caves, and has not yet been discovered above ground. But it is closely allied to *H. nitidus* (Templeton), that occurs in mould.

Pseudosinella cavernarum (Moniez) abounds in the Mitchelstown Cave. This is a blind white species that was first discovered in a deep cavern in the South of France. It has since been found in quarry-tunnels and in ants' nests in Scotland, and under stones on fields in Norway. Its congener, *P. alba* (Packard)—hitherto unrecognised in the British Isles—occurs in Dunmore cave. This species, though white, has well-developed paired pigment-spots on the head, each with two ocelli. It is known to inhabit North America, Norway, and South Germany.

Smythurus cæcus, Tullberg, is a very interesting blind species from the Mitchelstown Cave. It has been found also in an old quarry-tunnel near Edinburgh, and in mould in Northern Europe.

It seems that the only Irish cave-insect that can at all probably be considered blind and degenerate as the result of life in the darkness is *Heteromurus margaritatus*, which is, perhaps, the modified descendant of *H. nitidus*. If so, the form must have been independently developed in the different caves it inhabits.

Such insects as *Smythurus cæcus* and *Pseudosinella cavernarum* are evidently very ancient species that have become almost exterminated in the upper world, but are able to hold their ground in the caves. It has lately been suggested by Verhoeff that cave-faunas, as a whole, are survivals rather than special modifications. Certainly the Irish cave-fauna, so far as it has yet been investigated, afford support to this view.

But the richer fauna of the Continental caves must probably be, in part at least, due to modification. It would appear that the origin of cave-faunas is a more complex question than is usually imagined.

The PRESIDENT and Professor POULTON, in commenting on this paper, both expressed doubt as to the validity of the explanation given by the author.

THE AVIFAUNA OF IRELAND AS AFFECTED BY ITS GEOGRAPHY.

BY R. J. USSHER.

THE position of Ireland in the British Archipelago tends to leave its avifauna less disturbed by change: the configuration of the country, too helps to preserve its bird population, for the maritime counties, especially those of the west, are nearly all mountainous, while much of the interior abounds in lakes, and more than three-fourths of the area of the island are either under grass or unreclaimed moor. There are no large mining nor manufacturing districts outside the towns, and the rural population is small; moreover, birds are not persecuted much in Ireland except in pursuit of game, and Irish peasant boys are not keen about bird-nesting. Accordingly many species hold their own undisturbed in Ireland, and have a wide breeding range here, which compares favourably with their status in England, as the Stonechat, Dipper, Golden-crested Wren, Grey Wagtail, Rock Pipit, Goldfinch, Siskin, Twite, Lesser Redpoll, Corn Bunting, Chough, Magpie, Hooded Crow, Peregrine Falcon, Cormorant, Shag, Heron, Sheld-Duck, Red-breasted Merganser, Rock Dove, Water Rail, Golden Plover, Oyster-catcher, Woodcock, Common Snipe, Dunlin, Common Sandpiper, Common Redshank, Curlew, Arctic Tern, Little Tern, Black-headed Gull, Common Gull, Herring Gull, Great Black-backed Gull, Kittiwake, Razorbill, Black Guillemot, Guillemot, Puffin, Storm Petrel and Manx Shearwater. The Gannet has two large colonies in the south-west, and the Sandwich Tern has two breeding places. Of rarer birds that still breed in the island may be enumerated the Raven, Golden Eagle, Marsh Harrier, Hen Harrier, and Leach's Fork-tailed Petrel. Among the winter visitors, too, are many wildfowl, swans, geese, and ducks of both groups, which resort to the estuaries of the north and west, to some of the desolate moors, and to lakes and islands in prodigious numbers. Limicolæ, such as the Turnstone, Purple Sandpiper, Sanderling, Greenshank, and Bar-tailed Godwit, linger on into May, or even through the summer in the north-west, and the same may be said of the Great Northern Diver.

But, though certain species are rich in individuals, others, characteristic of certain parts of Great Britain, are not known to exist here at all:—Nightingale, Dartford Warbler, Reed Warbler, Marsh Warbler, Bearded Titmouse, Crested Titmouse, Nuthatch, Tree Pipit, Cirl Bunting, Tawny Owl, Capercaillie, Black Grouse, Ptarmigan, and Red-legged Partridge. With the exception of the Capercaillie, there is no reason to believe

that any of these have ever settled in Ireland in a wild state. Other species do not breed in Ireland, being either rare occasional visitants or scarce migrants. There are eight birds whose breeding range in Ireland is restricted—Whinchat, Redstart, Garden Warbler, Wood Wren, Yellow Wagtail, Tree Sparrow, Jay, and Stock Dove. Among the occasional visitants the British list contains a large number that have never been recorded from Ireland. The result is that the Irish list of birds contains much fewer species than that of Great Britain—a fact which holds good in other classes of animals—this is paralleled in other groups of islands, the outer members of which have a poorer fauna than the islands nearer to the adjacent continents. In the case of certain birds, as the Common Buzzard, the Bittern, and the Capercaillie, which formerly bred here, species have been exterminated by man's agency, and this has already been almost effected in the cases of the Woodlark, the Raven, the Eagles, and the Harriers. The absence of certain warblers, however, results from no such cause, but is of a piece with the circumscribed ranges of that family elsewhere; and, together with the absence of other birds, seems due to the fact that they have never established a footing in Ireland at all.

The list of cliff-breeding birds indicates considerable similarity between the bird fauna of the Irish and Scottish coasts, and the abundance of the Hooded Crow in both countries (to the almost total exclusion of the Carrion Crow), as well as the frequency of the Siskin and Twite, are other points of resemblance. Ireland also affords the most southern breeding resorts in Europe of the Common Gull and of the Red-breasted Merganser, both of which localities are in County Kerry. This leads to the consideration of the northern affinities of our avifauna, which are limited, as neither the Eider Duck nor several of the North British waders, the Skuas nor the Fulmar, breed in Ireland. Many birds have, however, visited Ireland from the high north, and several of these are from Arctic America or Greenland. The following North American species have visited Ireland, the figures representing the number of their occurrences:—American Robin (2), Purple Martin (1), Belted Kingfisher (2), Yellow-billed Cuckoo (2), Black-billed Cuckoo (1), American Goshawk (1), American Bittern (13), Snow-Goose (4), Surf Scoter (6), Hooded Merganser (4 or 5), Passenger Pigeon (1), Lesser Golden Plover (1), Pectoral Sandpiper (3), Bartram's Sandpiper (2), Bonaparte's Sandpiper (1), Buff-breasted Sandpiper (2), Spotted Sandpiper (1), Red-breasted Snipe (2), Eskimo Curlew (1), Bonaparte's Gull (1).

Six Antarctic and oceanic species have been recorded from the Irish coasts:—Yellow-billed Sheath-bill, Noddy Tern, Wilson's Petrel, Little Dusky Shearwater, Great Shearwater, Dusky Shearwater. The two last have been found by Mr. H. Becher to occur some years in considerable numbers off the Cork and Kerry coasts in the later part of summer.

Immigrant birds arrive on the coasts of Ireland in two main directions. The summer migrants and most of the passerine winter migrants land on the south and east shores, the County of Wexford receiving the

greatest proportion of the immigrants. In autumn many seem to travel along the coasts of Waterford, Cork, and Kerry, and thus wanderers have reached the Tearaght, as the Black Redstart, the Yellow-browed Warbler, and the Spotted Crake. This south-westward coasting movement accounts for the surprising number of rare birds that have been taken in the valley of the Cork and Youghal Railway, such as the Spotted Eagle, Griffon Vulture, several of the rarer Herons, and the Little Bustard; while other estuarine valleys in the west of Cork have yielded the Crane, the Stork, and the Spoonbill. Vast numbers of the commoner Passeres (known as "residents") arrive in autumn on our south-eastern shores to pass the winter in the South of Ireland, and Mr. Barrington's painstaking observations show that there is a second immigration in spring.† But those winter migrants that come from the far north arrive chiefly on the coast of Donegal, and pass down the West of Ireland towards Kerry, while some pass to the east coast by the North Channel. Among these are the Snow Bunting, Arctic Redpolls, Snowy Owl, Greenland Falcon, Water Rail, Golden Plover, Woodcock, Common Snipe, Glaucous and Iceland Gulls, Northern Diver, and Bernacle Goose.

The arrival of new species to settle in a country, and the conversion of winter visitants into resident breeding birds, are facts of special interest, of which there have been many instances in Ireland.

SECTION E.—GEOGRAPHY.

THE PEAT-BOGS OF IRELAND.

BY PROFESSOR T. JOHNSON, D.SC.

The author gave an account, illustrated by a large map, prepared by the Intelligence and Statistical Branch of the recently created Department of Agriculture and Technical Instruction for Ireland, of the distribution of the bogs of Ireland, which cover 1,861 square miles, chiefly in counties Donegal, Mayo, and Galway, and have an average depth of 25 feet. An account was given of the character of the different layers of a bog as seen in a vertical section, and an explanation suggested of the origin of a bog-slide. Specimens of the bog-flora, of the different kinds of peat, and of the economic products derivable from peat, lent from the Botanical Collections of the National Museum in Dublin, were lent.

GEOGRAPHICAL PLANT-GROUPS IN THE IRISH FLORA.

BY R. I. LOYD PRAEGER.

Ireland may be roughly likened to a saucer, of which the central depression consisted of a plain of Carboniferous limestone, the rim of a discontinuous series of mountain groups, formed of non-calcareous rocks. Much smaller than Great Britain, it displayed less diversity of climate as

well as of surface, and consequently less diversity of flora. The application of Watson's well-known "types of distribution" to Ireland is productive of some interesting results, and shows a considerable diversity of range in the same groups of plants in Great Britain and in Ireland. The "English" plants of Watson reach in Ireland their maximum on the east coast in Dublin, Wicklow, and Wexford, and are also remarkably abundant in Clare. Watson's "Scottish" plants show a more uniform range in Ireland. They attain their maximum in the northern maritime counties. Thence they spread down the west coast in considerable abundance as far as the Shannon mouth, while on the east coast they decrease rapidly south of Down. Watson's "Highland" plants are found chiefly in the west. They attain their maximum on the comparatively low hills of Donegal and West Galway, and are only sparingly represented on the higher mountains in the east, such as those of Down, Wicklow, and Tipperary. Watson's "Germanic" group is practically non-existent in Ireland; the fragments which reached that country have a quite irregular distribution, with a maximum in Clare. The "Atlantic" plants have a more definite distribution in Ireland, ranging round the coast, and showing an increase southward. A careful analysis of the distribution of plants in Ireland reveals the existence of several fairly well-defined types. There is a marked tendency to a "central" or "marginal" distribution, the result of the configuration of the country, the central group being largely composed of lowland, calcicole, and aquatic or paludal species; the marginal of calcifuge, upland, and dry-soil plants. Well-marked northern and southern, eastern and western groups also exist, the boundaries between them consisting of lines running not exactly east and west, or north and south, but rather north-north-eastward from Cork to Londonderry, and east-north-eastward from Galway Bay to Dundalk Bay. For these six types of distribution the author proposes the names Central, Marginal, Ultonian, Mumonian, Lagenian, Connacian, the last four being taken from the old names of the four provinces of Ireland, in each of which one of the groups attained its maximum. The characters of each plant group and its relations to the climatological and physiographic features of the country were pointed out.

THE CORK VALLEYS.

BY J. PORTER, B.E.

The author discussed the special features which were presented by the drainage system of Cork County, including the abrupt change of course which transfers each of the trunk rivers of the east from one longitudinal strath to a more southerly one, and the more or less straight and meridional character to the cross-courses. The paper connected the abrupt changes from one main strath to another with glacial interference, while it assigned to faulting and the rapid flow of the preglacial streams conjointly the determining part in bringing about the meridional character of the cross-courses and many of the tributary glens.

ROCKALL AND PORCUPINE BANK.

BY REV. W. SPOTSWOOD GREEN, M.A.

In June, 1896, the author had the rare opportunity of conducting a scientific expedition in the s.s. *Granuaile*, placed by the Congested Districts Board of Ireland at the disposal of the Royal Irish Academy for the purpose, to Rockall, the most out-lying speck of the British Islands. It stands on a bank to the N.W. of Ireland, cut off from the British plateau by a great abyss of 1,600 fathoms, covered with the globigerina ooze of the ocean depths, into which that plateau suddenly descends, from a depth of 300 fathoms, the edge of the plateau being found to be composed, wherever the author has trawled, chiefly of erratic subangular blocks or boulders. Within twenty yards of Rockall they got thirty fathoms of water, and the soundings at a short distance from any of the rocks was seventy fathoms. Some interesting specimens of animal life not belonging to the British fauna were discovered in trawling on the bank. A number of excellent photographs illustrating the appearance of the lonely isle were thrown on the screen.

SECTION K.—BOTANY.

FORMS OF *ERICA TETRALIX* FROM CONNEMARA.

BY PROF. I. BAYLEY BALFOUR, F.R.S.

Professor Balfour gave an exhibition of forms of *Erica Tetralix* from Connemara, namely, true *Tetralix*, *E. Mackayi*, and *E. Stuarti*, and referred to the new find of *E. Crawfordii*, at the same time pointing out that a well known garden form—*T. Lawsoni*—had, so far as he could discover, no history, and that it probably may be found in Connemara along with the others. He desired to direct the attention of Irish botanists to this last form, and also to controvert the statement of Linton in a recent number of the *Annals of Scottish Natural History*, where he, unaware, as since has been found out, of the careful account by Macfarlane in the *Transactions of the Botanical Society of Edinburgh* many years ago, describes as he thinks for the first time the form *Stuarti*, and makes it out to be a hybrid of *mediterranea*. The question of its being a hybrid was discussed by Macfarlane, and by his observations as well as his (Professor Balfour's) own, he is convinced that there is no *mediterranea* blood in *Stuarti*, although, as may be seen in the *Botanical Society Transactions*, he was disposed at first to look for some relationship with *mediterranea*.

The communication was illustrated with dried specimens of the plants referred to, and also specimens in spirit.

Prof. BOWER, Rev. C. H. WADDELL, and Prof. JOHNSON spoke briefly on the paper,

THE COMPOSITION OF THE FLORA OF THE NORTH-EAST OF IRELAND.

BY R. LLOYD PRAEGER.

The Counties of Down and Antrim form the most easterly part of Ireland, and the portion which most nearly approaches to Scotland. Their combined area is 2,148 square miles, and their flora numbers 820 species of Flowering Plants and Vascular Cryptogams, Antrim yielding 778 species, Down 752, the total flora of Ireland being reckoned at 1,020 species, and the average number occurring in an Irish county, according to present knowledge, at between 630 and 640. Down is formed of slates and granites, Antrim mainly of basalts. Limestone is very sparingly represented, and, while the number of calcifuge plants in the flora is large, the calcicole group is poorly represented. With regard to the types employed by Watson to show distribution in Great Britain, there is in the local flora an almost complete representation of British type plants. English type plants are rather poorly represented, and are more plentiful in the Antrim than in the Down flora. Scottish type plants reach in Antrim their maximum for Ireland; in Down they are somewhat fewer. Of Highland type species there is a fair representation as compared with other Irish counties of similar character; Antrim, though of less elevation, contains more alpine plants than Down. Germanic plants are extremely few in Ireland, being only thirteen in number, against 103 in England; of these the district yields but four. In Atlantic type plants Down and Antrim are comparatively rich. Turning to the types of distribution which the author has recently proposed for the Irish flora, the district is naturally very poor in Central type plants, which have largely calcicole and marsh species; while Mumonian and Connacian species are practically absent. Marginal type plants, on the other hand, are very largely represented, while of Ultonian species Antrim is conspicuously the focus, Down being considerably poorer. Lagenian plants are only tolerably represented, their focus lying further to the southward. As regards rare plants in the flora, Lough Neagh is phyto-logically one of the most interesting spots, not only in the district, but in Ireland. Here *Calamagrostis stricta* var. *Hookeri* is endemic; *Tolypella nidifica* (if the determination be correct) has its only British station; *Carex Buxbaumii* has its only other British station in Aberdeenshire; while *Spiranthes Romanzoffiana* is, outside the Bann basin, in Europe found only in County Cork. The Antrim basalt plateau yields *Saxifraga Hirculus*, *Orobanche rubra* (in plenty), *Equisetum trachyodon*; while the rarest plants of Down are *Elatine Hydropiper* and *Zannichellia polycarpa*.

Mr. A. G. TANSLEY, M A., congratulated Mr. Praeger on the very interesting and important work which he was doing in Ireland in a field which had been very much neglected since Mr. Watson's time. He

asked regarding the permanence of calcicole characters in plants in different countries, and whether Watson's types were still found suitable in Great Britain.

Professor T. JOHNSON, as a more or less local botanist, added his congratulations. In connection with the new Department they hoped to make a great change with regard to botanical study as practised in Ireland. Mr. Praeger with the help of half a dozen other workers, had been making careful examinations and researches into the distribution of plants in Ireland. In the Museum in Dublin they had a very fine collection of actual specimens, for which they had to thank Mr. Praeger.

Rev. C. H. WADDELL, desired also to thank Mr. Praeger for his paper. In his *Irish Topographical Botany* Mr. Praeger had given them a valuable generalisation as to the distribution of plants in Ireland. As to grouping, for his own part, he believed that a modification of Watson's system was what was required. Mr. Watson was, as regards botany, a Home Ruler, and separated Ireland from Great Britain. He (Mr. Waddell) was sorry to see Mr. Praeger was also a separatist.

The President (Professor REYNOLDS GREEN) regretted that so little attention was at present paid in these countries to geographical botany, as regards the causes of plant distribution.

ON WEISIA ROSTELLATA IN IRELAND.

BY J. H. DAVIES.

The species under notice, *Weisia rostellata*, Lindb., in England a rare plant, and one not previously known to occur in Ireland, was met with in December, 1901. It was detected, in some quantity, on a raised bank by the side of a field-path, near Lisburn, in the County Antrim. The usual situation in which it was found was the dried beds and muddy margins of pools. It therefore, at first, seemed singular that it should occur on the face of a grassy bank, but that was evidently composed mainly of material containing much organic matter, taken from an adjoining ditch, thus forming a matrix, not very dissimilar from that of the habitat which the plant generally affected.

VISITS TO WORKS.

The great manufacturing and commercial establishments of Belfast provided ample scope for interesting visits. Perhaps the shipyards claimed most attention, and large numbers of visitors took advantage of their presence in Belfast to see the famous Queen's Island works and those of Messrs. Workman, Clark, and Co. At the 100-ton crane the giant *Cedric* was

lying, the largest ship in the world, and excited much attention. The linen industry also claimed many visitors, and the works and warehouses of the York-street Company and Messrs. John S. Brown and Co. were several times invaded by numerous parties. Visits at stated hours were also paid to the works of Messrs. Inglis and Co. (bread and cake factory), M'Caw, Stevenson, and Orr (printing and lithographing), Dunville and Co. (distillery), W. A. Ross and Sons (mineral water manufactory), Salt Union, Limited (salt mining, Carrickfergus), Cantrell and Cochrane (mineral water manufactory), Belfast Ropeworks Co., Laganville Estate Brickworks; as well as to the National Telephone Co.'s Exchange, the Chief Fire Station, Electric Generating Station, and Gas Works—the last three being the property of the Corporation. The Harbour Commissioners on three successive days placed their steamer *Musgrave* at the disposal of members for the viewing of the harbour works and lough.

ENTERTAINMENTS.

In the way of social functions Belfast did its duty well. On Thursday evening, 11th instant, the Lord Mayor of Belfast (Sir Daniel Dixon, P.C., D.L.) gave a great reception in the Exhibition Hall adjoining the Botanic Gardens Park. Two thousand five hundred guests were present. From the hall the visitors passed into the conservatory, and thence across the lawn under an unbroken series of marquees to the splendid new fernery—perhaps the finest thing of its kind in the British Islands—which was formally declared open by the Lord Mayor, who was accompanied by the President of the Association and the Earl of Shaftesbury.

An equally brilliant function was the soirée given on Tuesday night, 16th instant, at the Harbour Office by Sir James Musgrave, Bart., and the Harbour Commissioners. Over two thousand invitations were issued, and the accommodation available in the building was supplemented by the erection of a large marquee.

The garden party in the Botanic Gardens Park given by the Local Executive Committee on Monday, 15th, was marred by heavy rain. The guests were received by the Earl of Shaftesbury, Chairman of the Committee, with whom was the Right Hon. George Wyndham, Chief Secretary for Ireland. Three spacious marquees, the conservatories, and fernery sheltered the assembly from the driving rain, and in spite of adverse conditions an enjoyable afternoon was spent.

Our reference to other social functions must be brief. Lord Shaftesbury's garden party, for which six hundred invitations were issued, allowed the visitors to appreciate the beauties of the Cave Hill, and of the magnificent view of sea and land that stretches in front of Belfast Castle. The combination by Mr. John Brown (one of the Local Secretaries) on Thursday, 11th instant, of garden party and visit to works was a happy thought. The party drove from Queen's College to St. Ellen's Works, where they saw the various processes of damask and linen weaving under the guidance of Mr. Herbert Brown. Thence they walked through the interesting old garden at Edenderry, crossed the River Lagan in boats, and walked to Longhurst, where Mrs. John Brown received them. On Saturday evening, 13th instant, Major and Miss Ritchie gave an enjoyable "At home" to about one hundred and fifty guests at "The Grove." On Tuesday, 16th instant, Lord and Lady O'Neill gave a garden party at Shane's Castle, which was largely attended and much enjoyed. The Ulster Medical Society gave on Monday evening, 15th instant, a smoking concert, under the chairmanship of Sir William Whitla, M.D., which was largely attended and hugely enjoyed by the male members of the Association and local friends to the number of about two hundred and fifty. On the same evening Prof. W. W. Watts entertained the delegates of Corresponding Societies in the Grand Central Hotel, where the air was thick with scientific discussion. On Saturday evening, 13th instant, the President of the Ulster Reform Club (Mr. James Moore) entertained the journalists who had come to Belfast for the Association meeting and their local brethren to a smoking concert. About one hundred guests were present. Many smaller private entertainments were given during the week.

EXCURSIONS.

Though the number of excursions on the official programme was limited to five on the Saturday of the meeting, a large number of unofficial trips to places of interest, some for general and some for special objects, took place. The Council of the Association imposed upon the Local Committee the unusual condition that the number of official excursions should be limited to five. This increased the difficulty of procuring suitable accommodation. This difficulty was met by the Excursion Committee, and arrangements were made for the first time by which any member could, on paying the fare, procure a ticket for the excursion he desired, without the usual formality of making a special application and awaiting allotment. The organising of the official excursions was carried out by William Gray, M.R.I.A., Ex-President of the Belfast Naturalists' Field Club, and all the excursions were conducted by members of that energetic Society. The enthusiasm displayed by many members as regards ensuring the enjoyment of the visitors deserves high praise. Thus, William Gray, in addition to conducting a three-day and two whole-day excursions, organised and conducted four afternoon trips on the business days of the meeting—a new feature at the gatherings of the Association. W. J. Fennell prepared and presented to members a special pamphlet illustrating his excursion to the Gobbins, and J. J. Phillips did the same for the Downpatrick excursion. J. St. J. Phillips arranged several special geological excursions for Section C, and Robert Patterson spent Saturday at the reception-room, giving local information and sending off many car-loads of visitors to various places of interest. Most of the excursions were carried out with that punctuality and smoothness which is a tradition with the Belfast Field Club. The Glenariff excursion (attendance 113), conducted by W. J. Fennell and J. St. J. Phillips, and the three-day Antrim Coast excursion, conducted by Messrs Fennell, Gray and Phillips, were models of good management. It is to be regretted that some of the other outings were not up to the standard. At the official excursion to Newcastle the programme was not carried out as arranged, the party got out of hand, and to unpunctuality succeeded hitches in the catering arrangements. But worse happened

at the historic Boyne, where to the impossible attempt to crowd 126 persons in and out of the New Grange tumulus in one hour, the horrors of a full-blown famine succeeded. A word of praise is due to the Northern Counties Railway Company, who treated the visitors most hospitably—providing special trains for the parties, and even acting as hosts on excursions. The Great Northern also gave ample facilities. The County Down Railway Company do not appear to have risen so well to the importance of the occasion. The responsibility for delay on the Newcastle excursion appears to rest chiefly on them. The largest party at any of the excursions was 325 at the Giant's Causeway. The total number who took part in the official excursions on Saturday was 701, or less than one-half of the number of members and associates present at the meeting. We append a very brief account of the various excursions.

THURSDAY, SEPTEMBER 11.

GIANT'S RING.—Mr. Gray conducted a party of sixty to the Giant's Ring on Thursday afternoon. The party drove from Queen's College, crossing the Lagan at Shaw's Bridge. The conductor and Rev. G. Buick, LL.D., briefly described the features of the great earthwork and cromlech.

SQUIRE'S HILL AND CAVE HILL.—Leader—Prof. G. A. J. Cole, assisted by Robert Bell and J. St. J. Phillips. A party of sixty drove to the Horseshoe Bend at foot of Ligoniel. They visited the numerous sections of Glauconitic Sands, Yellow Sands, Glauconitic Chalk, and Upper Chalk, all penetrated by basalt dykes and capped by basalt lavas. Mr. R. Bell's intimate knowledge of these deposits was constantly called upon by the members. From an elevated view-point Prof. Cole briefly detailed the leading points in the geology of the Belfast district. The party returned by Cave Hill quarry and Old Cave Hill road.

FRIDAY, SEPTEMBER 12.

BEECHMOUNT.—Leader—G. W. Lamplugh. A party of thirty-five visited the fine exposures of Keuper Sandstones, near the gates of the City Cemetery, subsequently passing on to sections

in Keuper Marls in the numerous brickfields adjoining. Mr. Lamplugh pointed out glacial gravels with shells, and an interesting deposit of finely laminated boulder clay.

CAVE HILL.—Mr. Gray acted as leader to a party who visited the Cave Hill. This excursion had mainly an archaeological bearing, and the caves themselves were made its central feature. From the summit, 1,188 feet, Mr. Gray pointed out the leading features of Down and Antrim as illustrated by the extensive view.

SATURDAY, SEPTEMBER 13.

On this day the Sections did not meet, and five official excursions were held.

GIANT'S CAUSEWAY.—Of the five excursions arranged for, the one to the Giant's Causeway was the most popular, the party numbering 325. Excellent arrangements were made by the railway, the electric tramway, and the hotels, and all went off well under the supervision of Dr. Traill, S.F., T.C.D.; W. A. Traill, C.E.; Captain F. H. Watt, J.P.; and William Gray, M.R.I.A.

The members of the party were delighted with their visit, and appreciated very highly the wild coast scenery, the ancient remains, and peculiar geological features of the locality. The cliff path along the Causeway headlands and bays attracted special attention, and evoked the desire for an opportunity to continue the walk to the further end of the cliffs and return by the cliff head.

ANTRIM COAST ROAD AND GLENARIFF.—Conductors, W. J. Fennell and J. St. J. Phillips.—A large party left for Larne by special train at 9.5, whence they drove along the beautiful Antrim Coast Road to Garron Tower. On the way many features of geological interest were examined, including the sections of Lias and Chalk at Waterloo, the great sloping columns of the basalt at Ballygalley, the fine Chalk cliffs and slipping Lias beds at Glenarm, and the great landslips of Garron Point. After lunch at Garron Tower, the drive was resumed, and Glenariff, with its cliffs and waterfalls, was explored. Tea was provided at the railway company's tea-house, and the party returned to Belfast *via* Parkmore. The excursion was enjoyable in every way.

NEWCASTLE.—After a hitch in starting, the party took the ordinary train. The delay in getting to Newcastle by rail caused some confusion, and the programme was not carried out as arranged. The botanical members unfortunately separated from their companions, to the disadvantage of all. The main body, under the guidance of the conductors, entered Tollymore Park, and having explored the woods and beautiful stream, drove on to Castlewellan, and through the grounds of the Castle back to Newcastle. After lunch the party scattered, many visiting the grounds of Donard Lodge; an evening train brought them back to Belfast. Messrs. Geo. Gray, M.D., W. H. Phillips, and J. H. Davies acted as conductors during the day.

ROSTREVR AND CARLINGFORD.—Conductors, Rev. Canon Lett and H. Barcroft. The party, on arrival at Rostrevor, visited the ancient sculptured Celtic cross in the churchyard of Kilbroney, and the celebrated Cloughmore, or “big stone,” which is a very large erratic boulder of granite resting on the slate rocks. In the afternoon Carlingford was reached by sea, and an inspection made of King John’s Castle, erected in 1210; the parish church, which has a castellated tower the walls of which are seven feet thick; the well-preserved small tholsel house, which spans one of the streets; the ivy-clad ruins of the abbey for Dominicans, founded in 1305, under the dedication of St. Malachy, by Richard de Lacy, Earl of Ulster; and two fine castellated mansions, both going sadly fast to decay, one of which is locally known as “the mint.” A most enjoyable day was spent, everything on the programme being carried through without the slightest hitch.

VALLEY OF THE BOYNE.—Conductors: Rev. Alexander Hall and Seaton F. Milligan.—The 7.30 morning train took a large party to Drogheda, whence they drove to the famous chambered tumulus of New Grange, which was specially lit by electricity by Messrs. Coates of Belfast. After a hurried visit, during which very light refreshments were served, the drive was resumed through the demesne of Townley Hall to Mellifont Abbey, and thence to Monasterboice, where the round tower, sculptured crosses, &c., were examined. A late arrival in Drogheda left but little time for dinner, and the 6.30 train was taken to Belfast.

THE GOBBINS CAVES.—Messrs. Scharff and Ussher, on behalf of the Irish Cave Fauna Committee, with Dr. Haddon and a few friends, took advantage of the off-day to visit, under R. Welch's guidance, the cave from which so many bones of mammals, birds, and fish, have recently been obtained by Mr. B. D. Wise, who joined the party, and kindly acted as host for the day. The cave was carefully examined by the party, and a report will be made later. Another cave which may also yield good results was examined, and some of the Seven Sisters Caves, which were entered from a boat. The party returned along the undercliff Cretaceous sections, and visited several of the curious Chalk rocks perforated by *Helix aspersa* and *H. nemoralis*.

ROSTREVOR AND CARLINGFORD (Sept. 13 and 14).—This excursion, which was limited solely to those professionally or otherwise intimately associated with the science of geology, was arranged originally to give Professor Sollas the opportunity of explaining personally the geology of Barnavave. In his unavoidable absence, the conducting of the party was undertaken by H. J. Seymour. A party of nineteen left the G. N. Terminus, Belfast, on Saturday afternoon, for Warrenpoint. Trams were taken to Rostrevor, where the first halt was made at the so-called green granite quarry behind the Mourne Hotel. The party then proceeded to the Cloughmore, and from this point, the chief characteristics of the geology of the surrounding district were briefly indicated.

Proceeding round the flanks of the mountains in a southerly direction, the party descended to the shore near Killowen, where they examined and obtained specimens of the lamprophyre dyke which occurs there. The modes of occurrence of these dykes, which are post-Silurian, and of the basalts which are post-Carboniferous were contrasted and explained. A short walk brought all back to Warrenpoint, whence they proceeded to Greenore Hotel, via Omeath.

The next morning an early start was made, and the party proceeded to walk across the low-lying flat tract of country, the so-called 25-foot raised beach, arriving shortly at the gently undulating ground of Carboniferous limestone forming the foot hills of the great igneous complex composing the Carlingford Mountains. Several limestone quarries were visited, and the dykes and sills of basalt traversing the

rocks were examined, and their effects on the sediment noted. It was observed that many of these dykes contain fragments of a coarsely crystalline rock rather like the eucrite of Slieve Foye. These patches might be regarded either as segregations or as portions of a plutonic mass torn off and carried upwards by the basalt dykes. In this latter case the basalts would be late Tertiary in age. A walk brought the party to a large gabbro or dolerite quarry on the flanks of Barnavave, where the conductor gave an account of the geology of the district. Attention was directed to the garnet-wollastonite rock originally discovered by the conductor. The rock has been formed from the Carboniferous limestone by contact action with the gabbro, which has completely enclosed blocks of the limestone and converted it into a rock composed of lime-silicates of at least five or six varieties. These include two garnets, wollastonite, idocrase, pyroxenes, and some others. Fluorite is also present. Proceeding up the slopes of Barnavave the penetration of the acid granophyre into the gabbro was clearly seen. On the way to Slieve Foye the fluxion or banded structure in the eucrite was pointed out as occurring locally. On the way down an exposure of the typical granophyre was visited and specimens obtained. At Carlingford cars met the party, who then drove on to Omeath, and left Warrenpoint by the 7.0 p.m. train for Belfast.

MONDAY, SEPTEMBER 15.

CULTRA.—Leader—A. M'Henry. Owing to heavy rains a small party attended this excursion. The adventurous five who braved the elements studied the outcrops of Triassic, Permian, and Carboniferous rocks to be seen on the shore, and returned well soaked but happy.

CARRICKFERGUS SALT MINES.—As the time allowed of only two and a half hours between leaving and returning to Carrickfergus station, this excursion was limited to some fifty persons. Many more applied for tickets, but the cages or "skips" at the Duncrue mine were well occupied in lowering the number who attended. The greatest credit is due to the manager of the mine for so admirably illuminating the vast chambers excavated in the salt-bed 900 feet below the pit's

mouth, and only the absence of any official leader to the expedition prevented a formal vote of thanks being accorded on the spot. Mr. A. Hogg's excellent lantern slides, taken on previous occasions underground, were exhibited at Tuesday's meeting of the Geological Section.

TUESDAY, SEPTEMBER 16.

LISBURN.—Leader—J. R. Kilroe. A party of eight were conducted over the esker and glacial gravels, Mr. Kilroe pointing out the important deductions made on his recent survey of the district. The examination of the esker was commenced about one mile N.W. of Lisburn, and following the tortuous course S.W. and then W. its similarity to the course of a river became evident. It was also apparent that the gravel forming the ridge had been laid down in a sub-glacial tunnel excavated by a river flowing *westward*. This direction of flow was indicated by the fact that there exists a fan of gravel three miles west of Lisburn formed in what was originally a lake into which the sub-glacial river flowed. It was pointed out by the conductor that the esker was a very typical one, with a narrow top, steep sides, and continuous. The party examined with interest the sections in the esker exposed in numerous gravel pits, and obtained several specimens of the Ailsa Craig riebeckite rock which is so widely scattered over this district.

ROUGHFORT.—A party of twelve visited Roughfort, and the kistvaen known as Cairn Graine, under the guidance of Mr. Gray, who pointed out the relation of the kistvaen to the other rude stone monuments of the county.

WEDNESDAY, SEPTEMBER 17TH.

COLIN GLEN.—On Wednesday afternoon, 17th instant, the majority of those who had supported the Botanical Section through five days of paper-reading went off to Colin Glen, headed by their President, Professor Reynolds Green, and conducted by their local Secretary, Rev. C. H. Waddell, and by S. A. Stewart. Showery weather did not interfere with the enjoyment of the party. The lower glen was explored. Though

the botanical season was over as regards flowering plants, several interesting species were found. *Neottia Nidus-avis* was obtained in fruit, with next year's buds already well developed. *Epipactis latifolia* was seen still in full flower, and very fine specimens of *Ophioglossum vulgatum*, a foot in length, were discovered. Mr. and Mrs. George Kidd most hospitably entertained the visitors in a cottage overlooking the glen. It was noted that the great recent floods had gouged out the whole bottom of the glen, exposing splendid sections of the Secondary rocks, tearing down much valuable timber, and forming formidable barricades of trunks and boulders.

DUNDONALD.—On this, the last of the four special afternoon excursions organized by the Field Club, Mr. Gray again conducted. A party of twelve drove to Dundonald, and visited the tumulus and the fine cromleac called the Kempe Stone. Showery weather interfered with the attendance at the last two of the special afternoon excursions, but the conception was a happy one, the trips were much appreciated, and the idea will probably be followed at future meetings of the Association.

LARNE LOUGH AND ISLAND-MAGEE.—Leader, J. St. J. Phillips. As no papers were on the programme for this day in Section C., a party of 25 started by the 9.50 a.m. train for Magheramorne, and visited the Chalk quarries, where a lively discussion was raised as to the origin of certain beds overlying the Chalk. The Estuarine clays were then visited. Boats were in waiting for the party and conveyed them to Kilcoan. Walking along the shores, Barney's Point was visited and fossils of the Lower Lias were observed in plenty. The fine section of Cretaceous beds above White House were examined in detail. After lunch, the members walked to the Gobbins and were enabled to observe the headlands from the new path. Cars met the party at the Gobbins Braes, and conveyed the members to the north end of Island-Magee. An opportunity was given of seeing the old iron-ore workings at Ballylumford. Crossing by ferry to Larne Harbour, the Larne gravels were visited, and the sections recently made near the aluminium works allowed the party to collect worked flints, &c. A brisk walk to Larne station followed, and the party returned to Belfast by the 6.5 train.

THURSDAY, SEPTEMBER 18.

THE GOBBINS.—One of the most pleasant and interesting excursions was that organised by the Vice-President of the Field Club (W. J. Fennell) to the Gobbins Cliffs on Thursday, September 18th, now accessible by means of the path constructed by the Northern Counties Railway Company, which has already been described in these pages. The number of places available (sixty) was applied for more than three times over. The party were the guests of the Railway Company, who conveyed them to and from Ballycarry station by special saloon train, and provided a sumptuous tea in one of the sea-caves at the Gobbins. Mr. Fennell and Mr. Wise (Engineer to the Railway Company) conducted, and the former presented each member of the party with a booklet containing an illustrated scientific account of the neighbourhood. At tea-time hearty votes of thanks were passed to both gentlemen, and on returning to Ballycarry an unusual and pleasant feature was a vote of thanks to the car-drivers, who, with the Railway Company, were joint hosts of the day. The weather was delightful, and everything went without a hitch.

DOWNPATRICK.—Conductors—W. Gray and J. J. Phillips. A party of thirty-one attended. On arrival at Downpatrick, cars were taken to the fine stone circle of Ballynoe, which was examined. Thence to the once-famous holy wells of Struell. At Ballyalton farm a stone circle and avenue were visited at the foot of Slieve-na-Griddle, and near Lough Money a small cromleac and a very fine example of a standing stone. Passing the ancient village of Raholp, the party drove to the site of the primitive church of Saul, the first founded by St. Patrick, and on the slope below the church, a pilgrimage was paid to the Mearn holy well. Driving past Quoile Castle, they proceeded to Inch Abbey, where Mr. J. J. Phillips, B.N.F.C., gave an interesting descriptive address. After refreshments, the party visited the Cathedral. Leaving the church, a rapid survey was made of the huge earthen fortification known as Dun Cealtair, and then the party hurried to the railway station.

TARDREE.—A party of seven geologists took a morning train to Templepatrick, whence they walked to Tardree

Mountain, where the exposures of rhyolite on both the north and south sides of the hill were examined. After tea at Tardree Inn, the party walked to Antrim, and took an evening train home.

FRIDAY TO MONDAY, SEPTEMBER 19-22.

ANTRIM COAST.---A pleasant party of twenty-six spent the week-end following the meeting in "doing" the Antrim coast. This was a special Belfast Field Club excursion, thrown open to members of the British Association, and those who availed themselves of the privilege were well rewarded. The party spent the first day in driving by the Coast Road from Larne to Garron Tower. Next day, Glenariff was explored in the morning, and in the afternoon the journey was continued to Ballycastle. Sunday was an off day; many short excursions were held. On Monday, Fair Head was visited, and in the evening, Belfast was reached in time to enable English visitors to catch the cross-Channel steamers. Messrs. W. J. Fennell, W. Gray, and J. St. J. Phillips conducted the excursion admirably.

MISCELLANEA.

A GREAT BELFASTMAN.

In concluding his Presidential Address in the Zoological Section, Professor G. B. Howes said:—"I feel that we must not leave this place without a word of sympathy and respect for the memory of one of its sons, an earnest devotee to our cause. William Thompson, born in Belfast, 1806, became in due time known as 'the father of Irish natural history.' By his writings on the Irish fauna, and his numerous additions to its lists, he secured for himself a lasting fame. In his desire to benefit others, he early associated himself with the work of the Natural History Society, which still flourishes in this city. He was President of this Section in 1843, and died in London in 1852, while in the service of our Association, in his forty-seventh year, beloved by all who knew him. His memory still survives; and if, as a result of this meeting, we can inspire in the members of the Natural History and Philosophical Society of this city, as it is now termed, and of its Naturalists' Field Club, an enthusiasm equal to his, we shall not have assembled in vain."

Just fifty years before, shortly after the death of William Thompson, Col. Sabine, President of the first meeting in Belfast of the British Association, said, in his Address :—"With ample and excellent accommodation, liberally provided in the fullest anticipation of our wants, and with the evidence which forcibly impresses itself on every side of rapidly increasing prosperity, opening a wide field for the practical application of science, our satisfaction in assembling here would be complete were it not clouded by the absence of one friend who would have been among the foremost to have welcomed us to this meeting which he prepared, the *Naturalist of Ireland*, whose memory will long be honoured and cherished by the members of the British Association."

THE BELFAST MUSEUM.

Were William Thompson among us still, he would rejoice to see that at length steps are being taken to redeem from the shameful state of neglect into which they had fallen, the natural history collections in the museum in which he took so active an interest. To Robert Patterson belongs the credit of having inaugurated this welcome movement, and we have already referred to what has so far been accomplished. We are glad to learn that work on the collections is to be continued during the winter, Wm. Swanston, R. Welch, and Robert Patterson having decided to devote an evening of each week to the work of renovation.

THE LOCAL PRESS AND THE MEETING.

If the educated class in general in Belfast did not rise to the occasion, the same cannot be said of the local Press. Their reports of both general and sectional meetings were excellent, and much impressed the visitors with their fulness and accuracy. The *Northern Whig* showed conspicuously in this respect. The paper was specially enlarged during the meeting, and devoted from twenty to forty columns per day to the proceedings of the Association; it received a special vote of thanks from the Local Executive Committee for its admirable reports.

"THE TIMES" ON THE MEETING.

The third Belfast meeting in respect of attendance has been very considerably below the average, the numbers being a little over 1,600, or about 300 less than in the case of the previous meeting twenty-eight years ago. This falling off is mainly due, we believe, to the fact that the people of the neighbourhood did not take an active interest in the meeting by becoming associates to anything like the extent that might have been expected. The number of old life members and old annual members, as well as of new life members and new annual subscribers from a distance, was not below that of the previous Belfast meeting, and was up to a fair average. There may be other reasons to account for the diminished attendance. Although the Saturday excursions were numerous and attractive enough, and the garden parties and other receptions of daily

recurrence, still there were no official excursions following the meeting. It is to be hoped that these will never be revived. There is no reason to regret the falling off if it is mainly due to the fact that the attractions to unscientific trippers were fewer than in the past. It is true that the diminished attendance led to the cutting down of the grants for scientific research to an unusually low figure, but, after all, there are nowadays many other ways of obtaining pecuniary support for such purposes. (*The Times*, September 22.)

“NATURE” ON THE MEETING.

In point of numbers, the meeting of the British Association at Belfast has not been a very large one, but it has certainly been a decided success and has been full of interest. . . . The local committee has facilitated the work of the secretaries in every possible way, and the excursions have been a means of pleasure and profit to all who have been able to take advantage of them. (*Nature*, September 18.)

General and warm approval has been expressed regarding the arrangements made by the local officials for the reception and comfort of the members, and although these were smaller in number than on the last occasion, this was not due to any falling off in those visiting Belfast, but rather to the apathy of local people, judging by the smaller number of associates' and ladies' tickets issued. . . . It has been questioned whether the falling off, especially in the number of ladies' tickets, may not be ascribed in a considerable degree to the educational methods of Ireland and their effect on the taste of those brought up under their influence within the last thirty years. . . . From the scientific point of view, the meeting was without doubt an admirable one. (*Nature*, September 25.)

THE ATTENDANCE AT THE MEETING.

In view of the above comments, it is interesting to compare the attendances of the 1874 and 1902 meetings :—

	1874.	1902.
Old Life Members,	162	243
New „	13	21
Old Annual Members,	232	314
New „ „	85	84
Associates,	817	647
Ladies,	630	305
Foreign Members,	12	6
	1,951	1,620

It will be seen that almost the whole of the falling off is due to the diminished number of associates' and ladies' tickets—the two classes of

local members—1,447 in 1874, 952 in 1902. Five hundred less local people attend the British Association at the expiration of twenty-eight years, though the population of the city has more than doubled itself in that time. It is a curious comment on the progress of Belfast.

GRANTS FOR SCIENTIFIC PURPOSES.

Out of £960 voted by the General Committee for scientific investigation only one sum of £40 comes to Ireland—the only grant, so far as we are aware, that was applied for by Irish men of science. This sum is voted to the committee who are investigating our cave-deposits under the chairmanship of Dr. Scharff. An abstract of the committee's report on their work last year appears on a former page.

BELFAST INITIATIONS.

Belfast has done its share in building up those adjuncts of the Association's meetings which tend to the convenience and pleasure of the member, and are now taken as matters of course. Thus, the daily Journal, without which members nowadays would be as lost sheep, was first suggested by the late Robert Patterson, F.R.S., at the Belfast meeting of 1852. When the Association revisited Belfast in 1874, the local committee produced a novelty in the B.N.F.C. "Guide to Belfast." Like the Journal, the Hand-book is now a necessary adjunct of the Association's meetings. The novelties supplied by Belfast to the recent meeting were the series of short afternoon excursions to places of interest, and the free tramway pass. Both were greatly appreciated.

THE HUMOROUS SIDE.

Professor Poulton, in opening the discussion on natural selection and mimicry in Section D gave an excellent practical illustration of the rapidity with which response of the organism to its environment may take place. The learned speaker had not yet been a week amid Hibernian surroundings when, in discussing the relative numbers of mimickers and mimicked in a particular case, he stated that "only one out of every thousand ants was a spider." This meeting was, indeed, full of fun, and might have been quoted by Mr. Sydney Hartland as a modern instance of the ancient Irish Bull-feast.

Professor Dendy's description, in moving a vote of thanks to Professor Howes, President of Section D, of that eminent zoologist as "an unicellular association for the advancement of biology," was another illustration of the rapid hibernicising of a visitor—even though he hail from the Antipodes. In returning thanks the President stoutly denied that he was "unicellular," even though he might be a "multinucleate syncytium."

Saturday, 13th September, 11 p.m.—I am fearfully tired—we were away at the Valley of the Boyne to see where the Belfast people got their party cries from. The two sides get so hot in the month of July that they have riots and throw stones and some queer sort of nuts that grow on the shores of the lough just at the mouth of the harbour. I haven't seen any of these nuts, but there was a good deal of talk about them, and I suppose they must be the ones that Mr. Lloyd Praeger said he had found chalcidified in the boulder clay.—(From "The Diary of the Jerboa," in *Ulster Echo*).

It was suggested in the *Northern Whig* that Mr. Sloan, M.P., might read a paper in the Botanical Section on "The Segmentation of the Orange as affecting the Representation of South Belfast," but that the subject would be as unintelligible to a cross-Channel botanical expert as a disquisition on "The Dorsiventrality of the Podostemaceæ" would be to a South Belfast elector.

In the Anthropological Section, one of the local papers dealt with a Settlement of Irish Elk-hunters near Groomspoint, County Down. We felt quite enthusiastic about these Bronze Age ancestors, living on cockles and venison on the sandy shores of Balloo Bay, and it was a sad shock to learn that a scrutiny of the bones exhibited revealed the fact that they were cow! It was only another case of the Bull-feast after all.

In a newspaper report of the Natural Selection debate, Mr. W. F. de V. Kane was credited with a reference to "dark coloured varieties of amphibious bacteria." He had not discussed protective coloration as applicable to virulent microbes, but to a harmless moth—*Amphidasys betularia*! What's in a name?

"Can you tell me what they mean by 'the Atlantis problem'? I see by the programme that Dr. Scharff is to read a paper on the subject."

"That's a printer's error most likely. It should read 'the Atlantic problem'—something about the Morgan combine, I should say."

"But it is in the Zoological, not the Economic, Section."

"Then take my tip Atlantis is an insect. For, whether to the scientists of the Section or to the working men of the city, these Johnnies have talked of creeping things all along. It would be a relief if they would trot out some big game for a change. I fancy, though, I've heard of a butterfly with some such name as Atlantis."

(Later.) "I find by the synopsis that Atlantis is the name of a supposed ancient empire (since submerged), which once united Europe to America."

"Then, after all, it was an Atlantic combine."—(From "Echoes from the Press-room," in *Northern Whig*.)

The programme of the Smoking Concert given by the Ulster Medical Society, in which extracts from the Presidential and Sectional addresses were illustrated at the expense of the orators, was one of the best things of the meeting, and recalled the joking in connection with the famous Red Lion Club. A local artist, Miss Praeger, supplied the drawings.

REVIEW.

THE BRITISH ASSOCIATION HANDBOOK.

A Guide to Belfast and the Counties of Down and Antrim.

Prepared for the Meeting of the British Association by the Belfast Naturalists' Field Club. Belfast: M'Caw, Stevenson, and Orr, Ltd. Pp. 8 + 284. Three maps, many illustrations. 2s.

As an important Irish scientific handbook, the "Guide to Belfast and the Counties of Down and Antrim," prepared by the Belfast Naturalists' Field Club on behalf of the Local Committee, and presented by the latter to each member and associate of the British Association, deserves more than a passing notice. As we are reminded in the preface, it was the Belfast Field Club who inaugurated the series of local handbooks that are now an indispensable feature of the Association's meetings. The Guide which they issued in connection with the 1874 meeting has long remained a useful work of reference both to the local naturalist and to the visitor. Now, after twenty-eight years, a new generation of Field Club members was called on to compile a new handbook. Great strides have been made in many branches of local science in the interval, and the Club had here an opportunity of producing almost an ideal Guide—one which might rank as a model of what such a book should be. The work placed in our hands at the meeting is well written, well illustrated, and well printed, yet it hardly comes up to the high expectations which we had formed of it. Perhaps our expectations were too high, for the Guide is undoubtedly the most concise, accurate, and attractive work of the kind yet produced in Ireland.

The book opens with a chapter on "Belfast: historical and descriptive," by John Vinycomb, and the author's name is a guarantee of the quality of the work. This is followed by "Belfast: its trade and commerce," by Alec Wilson. While Belfast is thus amply dealt with, it is surprising to find no historical or topographical account of the Counties of Down and Antrim, with the natural history and archæology of which the remainder of the book deals. In this respect the work contrasts unfavourably with the 1874 Guide, which contained a good abridged account of the history of Uladh and its subdivisions Dalriada and Dalaraidhe, and historical and descriptive notices of the principal towns of the two counties. A couple of pages were even devoted in the former Guide to the ethnology of the district; but, in spite of the advance of knowledge, this vital subject is not touched on in the

new Guide, and even such important local survivals as the slide-cars and block-wheel cars (the exhibition of which formed so interesting a feature of the recent meeting) are passed over. When we add that no information is given relative to agriculture (which also was treated of in the old Guide) or to the economic condition of the district, we have pilloried most of the faults of omission of this portion of the book.

The ensuing 186 pages are devoted to the natural history of Down and Antrim—geology, botany, and zoology. The whole of the geological article—50 pages—is the work of J. St. J. Phillips; at least, so it appears from the body of the book, though in the preface the assistance of H. J. Seymour is acknowledged. Mr. Phillips gives us an excellent account of the physical features, stratigraphical geology, and igneous rocks of the area. We think that the article might have been strengthened, and would have gained in interest, had the work been divided among those who have made a special study of different branches of local geology, as was wisely done in zoology and botany. Mineralogy is hardly referred to throughout the account, and further information relative to ores, mines, and mining would have been of interest. The post-Tertiary deposits, which in the Belfast district possess such peculiar interest, are very hurriedly passed over. If there is any direction in which the Belfast Field Club has distinguished itself, it is in investigations carried out on these beds and their fauna; and the work of Stewart and Wright in particular might have been expected to receive in this publication fuller recognition. Mr. Wright has however, at the end of his account of Foraminifera in the Zoological section, given some account of the occurrence of these Microzoa in local rocks of various geological periods. In places the writing is loose, as when the author says (p. 66), "Popular tradition places it [the origin of Lough Neagh] within the human period, and it may not be improbable that the tradition is altogether without foundation"—meaning apparently the opposite. We cannot, like Mr. Phillips, follow Sir A. Geikie in this suggestion, the inference from which is that Lough Neagh was created at the end of the first century, A.D.; if we place any reliance on this legend, we cannot well refuse credence to numerous other stories which deal with the formation of lakes throughout Ireland. Possibly a serious inundation occurred about the period mentioned. The record of the recent unprecedented floods in Belfast, had they taken place a couple of thousand years ago, might well have come down to us as a legend relating the origin of Belfast Lough.

Owing to the recency of the publication of the revised geological map of County Down, the term Ordovician remains in one or two places (pp. 60 and 70) where Silurian or Upper Silurian would now be more appropriate.

On p. 85 reference might be made to the possible Albian (or Selbormian) age of some of the lower Glauconitic Sands, a point to which Dr. Hume has called attention. On p. 99 the igneous rock of Cushendall is described as a quartz-felsite, a term usually reserved for orthoclastic rocks. It might be better styled a quartz-porphyrityte, or even a quartz-andesite. On p. 105 the spellings "tachylite" and "olivene" appear. But these are trifling matters when the extent of the article, and the references to original memoirs entailed in its preparation, are considered by the critical reader.

An observation on p. 82 as to the occurrence of "beds of Middle Lias" at Ballintoy seems to us to require further explanation. The blocks discovered in 1870 by Mr. Wm. Gray, and described by Professor Tate (*Quart. Journ. Geol. Soc. London*, vol. xxiv., p. 324), have been generally referred to the Drift; but Mr. Phillips is probably in possession of information respecting the bed *in situ*, and a statement of his evidence would have been valuable in a case of so much importance. Professor Tate, like Messrs. Sollas and Praeger, was inclined to assign the Middle Lias fossils found in the Irish Drift to the Inner Hebrides, rather than to a local source.

However, the points commented on above are minor faults, and the reader will find in Mr. Phillips's article a very good account of the geology of the north-east of Ireland.

Turning next to Botany, which occupies forty-two pages, we find Mr. Praeger responsible for Flowering Plants and Vascular Cryptogams, Mr. Waddell for Mosses, Hepatics, Fungi (including Lichens) and fresh-water Algæ; and Mr. Henry Hanna for the marine Algæ. The phanerogamic flora of this area is as well known as that of any in Ireland, and this has allowed the comparative method to be largely followed. Thus we have a local analysis of plants of Watson's "types," and also of the types which Mr. Praeger has recently proposed for Ireland; and comparisons of the Antrim with the Down flora, and of each with that of the adjacent counties. In the annotated list of rarer plants which concludes this section, we miss *Carex irrigua*, one of the most interesting recent additions to the Antrim flora, but the plant is referred to earlier in the article. Tyrella, given as the station for *Chara polyacantha*, is apparently a slip for Rathmullan. Mr. Waddell's chapter on the Mosses and Hepatics is excellent; the Fungi he treats cursorily, as becomes our slight acquaintance with them in the district; the fresh-water Algæ are also briefly disposed of; the Lichens are more fully dealt with. Mr. Hanna's contribution on the marine Algæ is meagre; we should have liked to see a more full account of the group in which he has done such good local work.

Ninety-five pages are devoted to Zoology. The Vertebrates are treated of by Robert Patterson; the various groups of Invertebrates have been wisely divided up among various workers, and the initials of nine different authors are appended to the various sections. A disadvantage of such multiple authorship is the difficulty of securing uniformity of treatment, and examples of this character are not far to seek. Thus, while thirteen pages are devoted to Fishes, only five go to Marine Mollusca, a better known and far more popular group of about equal size. Our very unequal knowledge of the Invertebrates also comes out conspicuously. A single page suffices for the three great groups of Polyzoa, Rotifera, and Nematoda. Comparing the account of Invertebrates as given in the 1874 and 1902 Guide, we find that good progress has been made in the interval in our knowledge of the Mollusca, Lepidoptera, Coleoptera, Arachnida, and Foraminifera; but in most of the very numerous other groups research has been at a stand-still. In marine zoology especially is this neglect apparent, and when we think of the enormous unexplored fields that lie open in this and other directions, we cordially wish that some of the northern energy that at present goes to

the collecting of colour-varieties of snails or the "obtaining" of casual bird-visitors (whose appearance is often either a meteorological or an avicultural phenomenon) were bestowed on some of the important groups that are still wasting their sweetness on the desert air. But to return to our Guide. Want of co-ordination between the compositor and the systematist is responsible for some startling innovations in classification. Thus, according to the type adopted for the classes, orders, &c., we find that the Hemiptera, Neuroptera, Orthoptera, and Aptera are not insects, and that the Crustacea are not Arthropods! We also learn with surprise that Tunicates are fishes!

In the case of the two large Vertebrate groups—the Birds and Fishes—a complete enumeration of species is given, with a note on the distribution of each, the whole extending to 31 pages. We cannot but think that more useful information might have been conveyed in less space by a different mode of treatment. Though bird life is profoundly influenced by immediate environment, no attempt is made to connect the distribution of the avifauna with the physical features of the district, or to group them according to similarity of habitat. Mr. Ussher's paper "On the distribution of birds breeding in Ireland,"¹ and his more recent communication to the British Association (see p. 283), show how profoundly interesting the subject so treated can become even to the general reader. A treatment of these groups by analysis, comparison, and collation with environmental influences, would have been quite in place in the Guide, which aims at laying before the reader something better than lists of species. Messrs. Welch and Orr's article on the Land and Fresh-water Mollusca is an excellent example of the kind of treatment we refer to, and is a model of what such an article should be. Looking over the Zoology as a whole, while it shows that our knowledge of certain groups is now on a very satisfactory basis, it appears to us to convey a more useful lesson in bringing clearly forward the enormous extent of the ground that has still to be covered before our knowledge of the fauna can be said to be in any way complete.

Last comes the chapter devoted to Antiquities, and running to thirty-seven pages. This we have found most disappointing. We had hoped to find some account of the early races of the district as illustrated by the abundant remains which they have left to us. Down and Antrim are famous in this respect, and this district possibly contains the key which will unlock to us the secrets of the "dim red dawn of man"—of local prehistoric history, if we may use the expression. The evidence supplied by the Neolithic raised beach at Larne, the hut sites of Whitepark Bay and Dundrum, the crannog of Lisnacrogghera, is of the very highest importance in elucidating the Later Stone and Bronze Ages. Yet in the 13 pages devoted to pre-historic archæology, no mention of these early settlements is to be found. The magnificent series of Neolithic stone implements for which the district is famous is likewise not referred to. In these respects the present Guide falls far behind that of 1874. The pre-historic section in the new Guide confines itself to brief notes, profusely illustrated, of monuments—cromleacs,

¹ *Irish Naturalist*, VI. 64-73. 1897.

stone circles, &c. ; and of certain dwellings—caves, souterrains, raths, and crannogs. Nearly two pages are wasted on the Cave Hill caves, though they are of no archæological importance, and there is not a shred of evidence to connect them with the pre-historic period. A Hibernian touch is given to this paragraph by the reference to "natural caves . . . which bear clear evidence of having being either artificially made or used by man." The remaining 24 pages deal with Christian antiquities. This section is more satisfactory, though its length as compared with that of the pre-Christian section is altogether out of proportion to its relative importance. Round towers, crosses, churches, and castles are briefly dealt with ; two pages are devoted to Arboe cross, which is outside the district with which the book deals. The archæological section is very fully illustrated. Of the 36 blocks, one-half are taken (without any acknowledgment, by the way) from Praeger's "Guide to County Down" ; of the others several are very coarse in texture, and cannot be said to improve the appearance of the pages on which they occupy so much space.

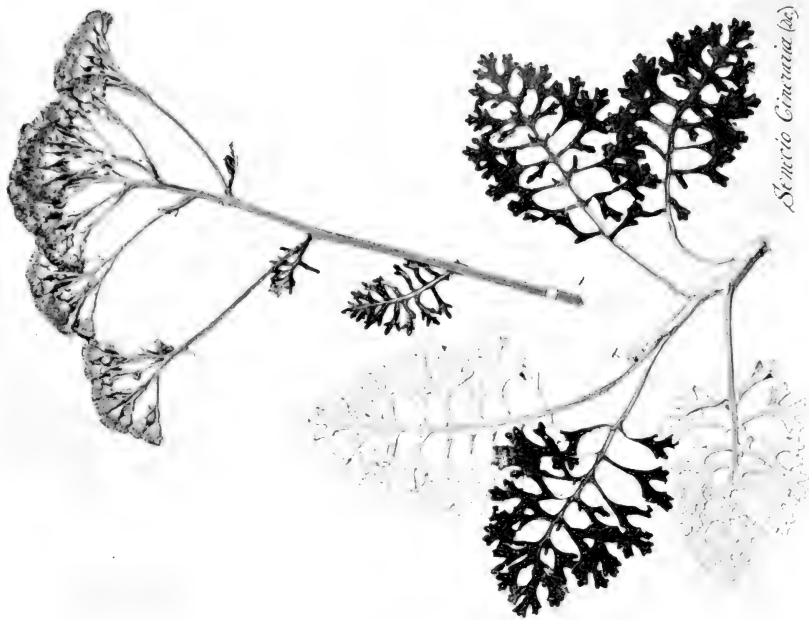
Three maps, done in the excellent style that characterises Messrs. Bartholomew's work, enhance the value of the book. A general map of the Belfast district (taking in only half of Down and half of Antrim) shows also the orography and condition of the roads—first-class roads seem sadly rare, by the way. A small but most useful geological map of the two counties and adjoining country follows. The archæological map strikes us as very incomplete. Only certain classes of ancient monuments or dwellings are included, and even as regards these some omissions occur. For instance, although several monuments are marked for North Louth, the grand cromleac of Ballymascanlan is omitted. The fine rath which overlooks Knock, and the interesting crosses of Donoughmore and Kilbroney, we fail to find ; and so on. Neither were we aware that there is a cromleac near Helen's Tower. No attempt is made to mark even the most important neolithic stations, nor are the lake-dwellings marked, though the information lies ready to hand in Col. Wood-Martin's well-known work.

The Index which concludes the work is very limited in scope, and might with advantage have been considerably amplified. The Index of the old Guide is much better.

Glancing back over the whole book, we must repeat what we have said already, that it is the most concise, accurate, and attractive scientific guide yet produced in Ireland. Most of the chapters bear the impress of care, judgment, and unstinted work, and the book is singularly free from misstatements of fact and other faults of commission. If our notice has dealt largely with its shortcomings, this is because of the high expectations we had formed of it, and our feeling of disappointment that in certain subjects a wider view has not been taken, and more proportionate treatment dealt out to various sections according to their relative importance to the general inquirer, the naturalist, ethnologist, or antiquary.



Senecio Jacquinii (Jac.)



Senecio Cineraria (Jac.)



X *Senecio albosens*

Fig. 3.

To face page 311.]



Senecio canescens (S. canesc.)?

Fig. 4.

A NEW SENECEO HYBRID.

A NEW *SENECIO* HYBRID.

BY F. W. BURBIDGE, M.A., AND NATHANIEL COLGAN, M.R.I.A.

[PLATE 5.]

AMONGST the many alien species established in the County Dublin flora, few are more interesting than the Mediterranean Ragwort, known to botanists under the names *Senecio Cineraria* DC., and *Cineraria maritima* Linn. It is now about a quarter of a century since Sir Francis Brady, Bart., sowed seeds of the plant in his garden near Dalkey, and adjoining Sorrento Cliffs, as the rocky crescent forming the northern limit of Killiney Bay is not inappropriately called. So congenial did this sheltered sea-nook prove to the southern stranger, that it slowly but steadily pushed its way by wind-borne seeds right round the sweep of rock, until, finally, it succeeded in almost monopolizing it from crest to high-water mark with its ample trusses of silvery white foliage. To-day, the plant is a conspicuous feature of the coast at this point, so much so that it arrests the attention of even the unbotanical traveller as he journeys by rail from Bray to Kingstown.

In the summer of 1901 one of us, who has paid special attention to hybrids and hybridising, observed what to less practised eyes would have seemed aberrant forms of this alien *Senecio* growing in Sorrento Park, a small enclosure of rocky ground which lies inland from the Cliffs, and at certain points approaches them to within a stone's-throw. The aspect of these plants at once suggested to him a natural hybrid, and this suggestion was strengthened by the presence close at hand of likely parents in the Common Ragwort (*Senecio Jacobæa* L.) and its Mediterranean congener, *S. Cineraria* DC. The suggestion was not followed up at the time; the plants were variable, and it seemed probable that at least some of them were rather shade-grown states of the Mediterranean species than the result of its natural crossing with our common Ragwort.

Early in the present year, however, we both agreed that these puzzling intermediates were deserving of further study. We accordingly paid many visits in company to the Cliffs and their neighbourhood, gathered a full series, in various stages of growth, of the suspected hybrid and of its probable parents, carefully noted their range and habit in the field, and, finally, compared, both in fresh and dried specimens, their minuter distinctions in flower and seed. The result was to convince us that the intermediates first noticed by one of us in 1901 were indeed the outcome of a natural crossing of *Senecio Cineraria* DC. with *S. Jacobæa* L. This conviction may be said to be based on circumstantial rather than on direct evidence, since the extreme practical difficulty in the way of producing artificial hybrids in such a genus as *Senecio* forbade any attempt to check our conclusion by the crucial experiment of making hybrids similar to those we found ready-made at Dalkey.

The available evidence may be most conveniently considered under two heads :—first, evidence derived from the observed combination or fusion in the intermediates of various characters of their assumed parents ; second, evidence derived from the peculiar distribution of the intermediates in relation to these parents.

Taking these heads of evidence in order, it may be noted in the first place that the intermediates through all their diversities (and they vary greatly in their degree of approach to *S. Jacobæa* on the one hand, or to *S. Cineraria* on the other), preserve certain obvious distinctive characters by which they may be discriminated at a glance. The stems and leaves and involucre are always less tomentose than in *S. Cineraria*, and more so than in *S. Jacobæa*, while the inflorescence is always more leafy, and the leaves themselves more finely divided than in the former species, though less so than in the latter. The general tone of colour of the foliage, too, is sufficient in itself to distinguish the three plants even at some distance, *S. Cineraria* being white, *S. Jacobæa* fresh green, and the intermediate grey, partly by reason of the underlying green showing through the thin layer of tomentum, partly from the colour of the tomentum itself. Eight visits were

paid to the Cliffs and the adjacent sea-banks in the interval between June 6th and August 28th of this year, and the result of careful observation was to show that the order of flowering of the three plants was, first, *S. Cineraria*; second, the intermediate, or hybrid; and, last, *S. Jacobæa*. Flower buds showed clearly on the first two plants on the 6th June, while no trace of them was to be seen on the neighbouring *S. Jacobæa*; on the 14th June a few heads of *S. Cineraria* were in full flower, and some of the intermediate's buds had just begun to show the yellow of the opening ray-florets; on July 7th many heads of *S. Cineraria* and a few of the intermediate were in full flower, while the yellow of the opening ray-florets of *S. Jacobæa* had just begun to appear; on July 24th all three plants were well in flower.

Two leading forms of the intermediate were readily distinguishable. These may be called *a* and *b*. In *a* the corymb branches were divaricate, and, so far, the form approached to *S. Cineraria*; but in other characters, and notably in the tenuity of the tomentum on stem and leaves and in the leafiness of the corymb branches, it suggested *S. Jacobæa*, to which species it came closer in general aspect. Similarly, with form *b* there was the same conflict of tendencies, the same hesitation about taking a decided line. The ascending habit of its corymb branches was strongly reminiscent of *S. Jacobæa*, but the comparative nakedness of its less ample inflorescence and the greater density of the tomentum on stem and leaf gave the form a general aspect of *S. Cineraria*. Of the two forms, *a* was by far the more distinct and the more frequent, and we have no hesitation in selecting it as the typical hybrid.

The points just touched on are the more obvious field marks of the hybrid. A fuller statement of its distinctive characters and of those of the parent species will now be given. At this stage the necessity of naming the plant presents itself, and the questions arise—is it non-descript? and, if not, has its hybrid origin been previously proved or suggested? Focke, in his *Pflanzen-Mischlinge*, makes no reference to any such hybrid. Neither Boissier (*Flor. Orient.*) nor Willkomm and Lange (*Prod. Flor. Hisp.*) mentions any variety of *S. Cineraria* as occurring either in the eastern or in the western Mediterranean

region. Tenore, indeed (*Ind. Sem. Hort. Neapol.*), has a *Cineraria cceratophylla*, but this appears to be merely a variety in which the leaves are white above, and not shining green or sparingly pilose, as in the typical plant. Nyman, however (*Conspect.*, p. 350) places as sub-species under *C. maritima* a *C. calvescens* (Mor. Dnt.), the name here suggesting a plant less densely tomentose than *C. maritima*. We are indebted to the courtesy of the Director of Kew Gardens for a transcript of the characters of this plant, and for a tracing of a figure from the work in which it was first published, the *Florula Caprariæ* of Moris and De Notaris, a Latin flora of the island of Caprera, printed in the *Acta* of the Royal Academy of Sciences of Turin in 1839. Both plate and distinctive characters of the Caprera plant agree rather closely with the form *b* of the Irish hybrid; but the plate represents something widely different from the form *a*, which is the prevalent and characteristic one. The authors of the *Florula Caprariæ* describe *S. calvescens* as a species, and make no suggestion of hybridism. Indeed, a hybrid origin for the Caprera plant seems improbable, for although both *S. Cineraria* and *S. Jacobæa* occur in the Italian island, they appear there under conditions highly unfavourable to the production of a natural hybrid. The habitat of the first species is given in the *Florula* as *in rupestribus littoreis*: the second is set down as very rare, and occurring (only as a variety of the type) *in herbis secus rivulos*, while the authors state that they have not seen the plant in flower. We have had no opportunity of comparing the form *b* of our Dalkey plant with Caprera specimens of *S. calvescens*, of which there are none in Kew Herbarium, so that we cannot as yet decide whether the plants be identical. So widely, however, does the characteristic form, *a*, of our hybrid differ from the figure of the Caprera plant that it seems to deserve a distinctive name. The specific adjective *albescens*, being apparently unappropriated in either of the genera *Cineraria* or *Senecio*, we venture to propose for this interesting Irish hybrid the name, \times *Senecio albescens*.

The following statement of the distinctive characters of *S. albescens* and of its parents is founded on an examination of numerous fresh and dried specimens of all three plants of which fairly typical examples are represented on Plate 5:—

Senecio Cineraria DC.

Perennial and sub-fruticose: Stems, corymb branches, involucre and under side of leaves covered with densely felted, white tomentum; leaves petioled, coarsely pinnatifid, the segments usually with entire margins towards the base and bluntly lobed towards the extremity, the limb of the leaves much inflexed so as to expose the white under-surface; flowering stems with a few distant leaves above, rising from amongst ample trusses of barren leafy shoots; inflorescence almost naked, corymb branches divaricate; ray florets broadly ligulate, averaging $\frac{4}{3\frac{1}{2}}$ in. in breadth and $\frac{1\frac{1}{2}}{3\frac{1}{2}}$ in. in length, the tubular portion with an average length of $\frac{6}{3\frac{1}{2}}$ in.; fertile seeds numerous, smooth.

Senecio Jacobæa Linn.

Biennial and herbaceous; Stem usually glabrous and purplish; leaves sessile, semi-amplexicaul, with laciniate auricles, fresh green, glabrous or sparingly pubescent, the segments irregularly and much lobed throughout; corymb branches ascending, their upper parts, the pedicels, and the base of the involucre with greyish pubescence; inflorescence densely leafy; ray-florets narrowly ligulate, averaging $\frac{2}{3\frac{1}{2}}$ in. in breadth and $\frac{1\frac{1}{2}}{3\frac{1}{2}}$ in. in length, the tubular portion with an average length of nearly $\frac{4}{3\frac{1}{2}}$ in.; fertile seeds numerous, those of the ray smooth, of the disc pilose.

× **Senecio albenscens.**

Biennial, herbaceous: Stem, corymb-branches, involucre, and under side of leaves covered with a thinly-spread grey tomentum, the stems occasionally purplish below; leaves pinnatifid, amplexicaul and auricled, the segments much lobed; corymb ample, with divaricate branches, leafy, but less so than in *S. Jacobæa*; ray-florets averaging $\frac{4}{3\frac{1}{2}}$ in. in breadth and nearly $\frac{1\frac{1}{2}}{3\frac{1}{2}}$ in. in length, the tubular portion with an average length of $\frac{5}{3\frac{1}{2}}$ in.; perfect seeds infrequent, those of the ray smooth, of the disc obscurely pilose.

To come now to the second branch of the evidence, that is to say, evidence drawn from the distribution of the hybrid and of its parents. It was found that on the Sorrento Cliffs, properly so called, only one *Senecio* occurred, the alien *S. Cineraria* DC. Here there was no Common Ragwort (*S. Jacobæa*) and no hybrids of either form. But passing from the Cliffs proper to the railway embankment, on which they abut at their western extremity, at the point where the line pierces a spur of the Dalkey granite hills with a short tunnel, both the Common Ragwort and the hybrids at once began to appear, mingled with typical *S. Cineraria*. Passing along southward towards the Vico bathing-place, *S. Cineraria* and

the hybrid, *b*, both grew rarer and rarer, until they almost ceased at the bathing-place. Thence for nearly a quarter of a mile farther south-westward along the steep cliffs capped with drift, both *S. Jacobæa* and the hybrid, *a* (*S. albescens*) continued to appear in association, *S. Cineraria* being quite absent from the latter half of this distance. The inland extension of *S. albescens* was small. Several plants appeared in Sorrento Park above the Cliffs, others appeared by the roadway above the railway at Vico, others again near Cooliemore Harbour, about a furlong north of the Cliffs—some even on the summit of the hill above Khyber Pass—*S. Jacobæa* in all of these stations occurring close by. But the headquarters of *S. albescens* were along the railway-banks and sea-banks at and near Vico bathing-place, and along the cliffs and banks by the sea to the south-westward.

On the assumption of a hybrid origin for the intermediates, it seems at first rather hard to account for their peculiar absence from Sorrento Cliffs, where one of the parents grows in such abundance, and at some points within a stone's-throw of the other parent. The pollen of both of the assumed parent species is equally adapted for wind or insect carriage. Cross-fertilization must have been effected by either agency; and it seems just as inadmissible to assume the winds to have blown persistently from *S. Cineraria* towards *S. Jacobæa* as to assume the honey-seeking insects (bees, most probably) to have invariably travelled in the same direction. Both the winds and the bees must have frequently travelled in the reverse direction, carrying the pollen of *S. Jacobæa* to the stigmas of *S. Cineraria*, perhaps as often as they carried the pollen of the latter species to the stigmas of the former. And this being so, does not the absence of intermediates, it may be argued, from the cliffs where *S. Cineraria* reaches its maximum, show that the suggested formation of hybrids does not really take place. If we assume, however, what has long since been proved for other species capable of producing hybrids, that there is a want of reciprocity of cross-fertilization between *S. Cineraria* and *S. Jacobæa*, the difficulty disappears. The pollen of *S. Cineraria* may be able to fertilize the ovules of *S. Jacobæa*, while the pollen of the latter is inert as regards the ovules of the former. There may be, in short, a perfectly free interchange of pollen

between the two species, while the fertilizing effect is quite one-sided. The parentage of the hybrid, then, should be thus expressed:—♂ *S. cineraria* DC., × ♀ *S. Jacobæa* L.

The appearance of *S. albescens* in Ireland affords a most interesting example of the disturbing influence which may be exercised by the introduction of a new element into a flora already in a state of equilibrium. The alien *Senecio Cineraria* from the shores of the Old World sea has not merely succeeded in founding a vigorous colony a thousand miles northward of the Pillars of Hercules,—it has contracted an alliance there with a native species equally vigorous and aggressive, and the fruit of this union has been a new race in which the characters of both parents are happily blended. Whether this new race will show itself capable of self-perpetuation yet remains to be seen. The fact that it produces, though in small quantity, freely germinating seeds, would suggest that it may have this power of self-perpetuation; and, should this prove so, then a new species or sub-species of hybrid origin may be said to have been born on the shores of Killiney Bay.

This is the second instance of an alien *Senecio* from Southern Europe having hybridized naturally with a native species in Ireland. The first instance, as is well known to Irish botanists, is to be found in the plant detected by Isaac Carroll near Cork in 1853, named by Syme as a variety of the Common Groundsel, but subsequently set down by Dr. Focke as a natural crossing of that species with *S. squalidus* Linn.

Dublin.

EXPLANATION OF PLATE 5.

Fig. 1.—*Senecio Jacobæa* L. From a specimen gathered at Portmarnock, Co. Dublin, July 14, 1902.

Fig. 2.—*Senecio Cineraria* DC. From a specimen gathered on Sorrento Cliffs, Dalkey, Co. Dublin, July 24, 1902.

Fig. 3.—× *Senecio albescens*—A hybrid between *S. Cineraria* and *S. Jacobæa*, approaching more closely to the latter. From a specimen gathered on the sea banks at Vico, Dalkey, Co. Dublin, July 24, 1902.

Fig. 4.—A hybrid of like parentage with *S. albescens*, but more closely approaching to *S. Cineraria*. Perhaps identical with *S. calvescens* (Mor. & De Not., *Florula Caprarie*, 1839.) From a specimen gathered at Vico, July 24, 1902.

All of the figures about 1/3 natural size and photographed from herbarium specimens in which the form of the flowers is imperfectly shown.

IRISH SOCIETIES.

ROYAL ZOOLOGICAL SOCIETY.

Recent gifts include a Badger from Mr. J. Stuart, a Barn Owl from Mr. G. Campbell, a Corncrake from Mrs. Powell, a Sparrow-hawk from Mr. J. Varian, a pair of Bullfinches and four Crayfish from Mr. W. W. Despard, a Black Cuckoo from Mr. H. B. Rathborne, two Parrots from the Countess of Portarlington, and six Ceylonese Terrapins from Mr. A. E. Jamrach.

Three Lion Cubs and a Llama have been born in the Gardens. An Antelope, a pair of Lemurs, three Squirrels, and a pair of Indian Porphyries have been purchased.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

NOVEMBER 5.—The President of the Society, JOHN BROWN, F.R.S., gave an opening address on the subject:—"The Liquefaction of Gases." Some experiments with liquid air were shown, the material for which was supplied by Mr. Richard J. Moss, Royal Dublin Society.

BELFAST NATURALISTS' FIELD CLUB.

SEPTEMBER 27. THE GOBBINS.—The interest taken in the cliff path round the Gobbins, now in course of construction by the Northern Counties Railway Company, was shown by the fact that 126 members and friends—the record number for a Club excursion—took part in this last field meeting of the season. The path and caves, which have been recently described in this Journal, were visited, and an instructive day was spent.

JULY 26. THE GIANT'S RING EXCURSION.—The Editors' apologies are due to the Belfast Field Club for an error on p. 251 of this Journal, where it is stated that no excursion took place on this date. The official conductor did not put in an appearance, but fortunately one of the Secretaries of the Dublin Club was present, and at his suggestion 14 members started as arranged, and carried out the programme, visiting the Giant's Ring and the Lagan, and spending a profitable and pleasant afternoon. Insects were conspicuous by their absence, and the fields were so saturated by recent rains that botanical collecting was not promising. The only noteworthy plant found was *Carex teretiuscula*, which occurs in a small marsh just below the Ring. This was, no doubt, the very spot where, nearly a century ago, Templeton found this sedge. Mr. Davies re-found the plant in 1896, and it is still there in some quantity. No other station in County Down was known until, in the present year, Mr. Praeger discovered it near Ardglass. The President

of the Belfast Natural History and Philosophical Society, Mr. John Brown, F.R.S., met the party at the Ring, and his invitation to visit his house was gladly accepted. Under his guidance they had the pleasure of inspecting the fine gardens at Edenderry House; then they were piloted across the Lagan by Mr. Brown in his private ferryboat. On reaching Longhurst the hospitality extended by Mrs. Brown to the party was generous, and they proceeded, guided by Mr. Brown, to inspect his electric workshops. It has been a tradition of the Club from its earliest days to adhere to arrangements made and announced, and those who, notwithstanding the unpromising weather, went through the programme on this occasion, were much gratified by the result. The Editors' thanks are due to Mr. S. A. Stewart for drawing attention to their mistake, and supplying them with this report of the excursion.

DUBLIN NATURALISTS' FIELD CLUB.

NOVEMBER 4. —The Annual CONVERSAZIONE was held in the Royal Irish Academy Rooms, and was well attended by members and visitors, the number being slightly larger than last year. The President, W. F. DE V. KANE, D.L., occupied the chair, and after a few words of welcome to the visitors present, and to the members of the Belfast and Cork Clubs who attended the meeting, called on the Hon. Secretary to read the report of the judges in reference to the Prize Competition No. 7, for which one entry had been received. The judges recommended that the full prize be awarded to "Errigal." The President then announced that the prize winner was Mr. E. Gallagher, and while congratulating him, he expressed the hope that more members would compete next year.

Mr. D. HOUSTON, F.L.S., then gave an interesting lantern demonstration, entitled "Photographic Study of Trees." The trees selected for illustration included only the commonest species. Each selected tree was first of all shown in its winter condition, in order to demonstrate its skeletal form and detailed branch ramifications. Then after showing a single leaf to give an idea of its shape, a photograph of the same tree taken from the same position as in winter, but in full summer foliage, was presented on the screen for comparison. Finally, photographs of the flowering and fruiting sprays of the tree were given, thus completing the cycle of the year. Particular attention was directed to tree-form, and to the chief factors that, in nature, influence the final shape of a tree. Incidental references were made as to the most suitable localities for particular species, and to the relative powers of adaptation among trees —the Scotch Fir being specially referred to as having the latter quality most wonderfully developed. At the conclusion of the demonstration several nominations for membership were formally read out. The remainder of the evening was spent in examining the interesting exhibits contributed by the members. A meeting of the Field Club Union Committee took place during the evening at which some important matters were fully discussed; these will be formally brought to the notice of the Field Clubs by their representatives at a later date.

The following is the list of exhibits which were on view during the evening, and amongst those deserving special mention were the model of the Crumlin meteorite shown by Mr. Fletcher of the British Museum, and the splendid collection of plants shown by Mr. Moore of the Botanic Gardens, Glasnevin.

F. W. Burbidge, M.A., Vice-President.—Specimen of *Azolla* in fruit; A new hybrid *Senecio* (*S. albescens*, Burbidge and Colgan). G. H. Carpenter, B.Sc., and J. N. Halbert.—Specimens of Irish Wasps and Bees, with their nests, from the National Museum. Prof. Cole, F.G.S.—Models of Swiss scenery, by Prof. Duparc of Geneva, illustrating mountain structure. T. Crook, A.R.C.Sc.I.—Series of specimens illustrating stages in the gradual formation of soil from rocks. Volcanic dust from Barbadoes. Mrs. Espinasse.—Mounted specimens of the leaves of the Lace plant grown in Mauritius. L. Fletcher, F.R.S. (British Museum).—Model of the meteorite which fell at Crumlin, near Belfast, Sept. 13th, 1902. Dr. A. H. Foord, F.G.S.—Some new types of Irish fossils, with unpublished lithographic illustrations of them. E. Gallagher.—Map showing the distribution of Heather in the 1" Ordnance Survey Sheet, No. 112, Dublin. W. F. Gunn.—Ornamental and flowering plants. Seeds of the Castor-oil plant, and specimen showing "smut" in oats. J. de W. Hinch.—A collection of glacial erratics from Co. Dublin. Prof. T. Johnson, D.Sc.—Leaves of Irish peat-mosses. G. W. Lamplugh, F.G.S.—The new "Drift" map of the Dublin area, Sheet 112 of the Geological Survey of Ireland. D. McArdle.—Specimens of rare Mosses and Hepaticæ, mounted on cards and as microscopic objects. Miss A. L. Massy.—(a) Map showing the distribution of certain Mollusca in North Co. Dublin, (b) Irish Mollusca collected during 1902, (c) Whale's ear bones from Norway. F. W. Moore, A.L.S.—Plants from the Royal Botanic Gardens, Glasnevin. A. R. Nichols, B.A.—A Sea-urchin (*Strongylocentrotus*) with Parasitic Crab (*Pinnotheres*). Dr. G. H. Pethybridge.—Vivipary in inflorescence of *Dactylis glomerata* (Cocksfoot), caused by attack of Ergot (*Claviceps*). R. Ll. Praeger, B.A., B.E.—Recent additions to the flora of North-east Ireland. A. Roycroft.—Fossils from the Carboniferous Limestone, Skerries, and "petrified" wood from Barnagearagh Bay, Skerries. Dr. R. F. Scharff.—Remains of a new Irish Mammal and of other Mammals from the Keash caves, Sligo. F. M. Sellens.—Living specimens of microscopic pond life. H. J. Seymour, B.A., F.G.S., Hon. Sec.—(a) stalactites from the Boho caves, Enniskillen, (b) Collection of Portlock's original specimens of zeolites from Cos. Antrim and Derry. Miss L. Shackleton.—Illustrations of British natural orders of flowering plants for the Dublin Museum, Botanical teaching collection. R. Welch (B.N.F.C.)—Photographs taken on the occasion of the joint excursion of the Dublin and Belfast Field Clubs to Enniskillen in July. Some methods of mounting and storing small species of Mollusca. E. Williams.—(a) Glossy Ibis (*Plegadis falcinellus*), from Co. Wexford, (b), Albino Curlew (*Numenius arquatus*), from River Foyle.

NOTES.

BOTANY.

Pleospora herbarum on Clover.

I found great quantities of *Trifolium minus* growing at St. John's Point, Co. Down, last July, so altered in appearance that I thought it must be one of the rarer maritime species. It was sent to the National Museum, and Prof. Johnson says the fungus with little black fruits which have so altered its appearance is *Pleospora herbarum* Pers.

C. H. WADDELL.

Saintfield, Co. Down.

Maidenhair Fern in north-east Galway.

Mr. W. S. Waithman has sent me specimens of *Adiantum Capillus-Veneris* collected by him on the limestone pavements east of Galway. This forms an interesting extension of range, the nearest stations being Ballyvaughan on the south and Roundstone on the west.

R. LLOYD PRAEGER.

Dublin.

Polystichum angulare var. acutilobum in Co. Cork.

Among some plants sent to me by Mr. R. A. Phillips is a fine frond of this famous variety, gathered by him at Glanmire in 1891.

R. LL. PRAEGER.

Dublin.

Malaxis paludosa in Donegal.

Mrs. Leebody has favoured me with a sight of a specimen of the Bog Orchis, collected near Slieve Snaght, on August 27, by Dr. T. V. Campbell. Mr. D. C. Campbell, who visited the locality under his brother's guidance in search of more of it on September 4, writes to Mrs. Leebody:—"The *Malaxis* was found among *Sphagnum* moss in one of the tiny runnels among the heather. It was not on Slieve Snaght, but on the rising ground that leads up to it, about three-quarters of a mile from Drumfries Station, a little above the stream. I should say the spot is about 500 feet above sea-level, and about 150 feet above the cultivated land around." Dr. Campbell's find forms a very interesting addition to the flora of Donegal. The only previous Ulster stations are several in Antrim (last seen by S. A. Stewart in 1878), and one in Armagh (not seen for at least forty years).

R. LLOYD PRAEGER.

Festuca rigida at Banbridge, Co. Down.

For the County Down this grass seems to have been reported only from the coast. It also occurs, in some plenty, on a wall-top near the Banbridge railway station, where it was noticed last summer.

J. H. DAVIES.

Lisburn.

Milium effusum in Co. Dublin.

In June last I noticed *Milium effusum* growing sparingly in the grounds of Bushy Park, Terenure. I reported this to Mr. Colgan, who replied that he had no note of the plant in Co. Dublin even as a casual, and supposed that it must be regarded as such at Bushy Park. The grass grows very sparingly among some old laurels, and while various ornamental plants, such as *Symphytum tuberosum* and *Hypericum Androsæmum* flourish in the neighbourhood, native species also grow which often accompany *Milium* in wild ground, such as *Luzula maxima* and *Ranunculus Auricomus*. I felt inclined rather to regard *Milium* here as a relic of the time when wilder conditions prevailed in Co. Dublin. The plant is frequent in the adjoining portion of Wicklow, and might well have formerly flourished in South Dublin. The precipitous banks overlooking the Dodder in Bushy Park have probably always been wooded, and would form a refuge for the plant. Direct evidence of introduction there is none; no shrubs or herbs have been brought from outside into that part of the demesne for a long period, and the habitat is just such as might lead one to expect *Milium*. The fact that the undergrowth in this part of the woods is now mown down every summer would tend to keep down the plant. To endeavour to throw some additional light on the problem, I examined the Dodder banks more carefully. *Epipactis latifolia*, which turned up sparingly further down stream in Bushy Park—a wood plant very rare in Dublin—strengthened the case for the occurrence of remnants of an old wood flora here. But the matter was to my mind set at rest by the discovery of a second patch of *Milium*—though a still smaller one—on the precipitous wooded bank that overlooks the Dodder between Rathfarnham bridge and Rathgar bridge. Here the plant grew among thorns with *Brachypodium sylvaticum*, *Bromus asper*, and *B. giganteus*. A few plants of *Epipactis latifolia* grew not far away, and *Orobanche Hedervi* occurred frequently. This bank is now much intersected with little paths; its vegetation is trampled by boys and loungers, and its more interesting native plants are clearly on the way to extinction. Miss M. Knowles tells me that from the opposite side of the mill-race that runs along the foot of this bank she noticed *Milium* here a few years ago. There must have been more of it then than now, as the only patch I found could not have been seen from the other side of the mill-race. The suggestion may be made that this grass is introduced in both stations above mentioned; but credulity has its limits, and the limit of mine would be reached if asked to believe that a plant which has many stations within twenty miles, and which is quite likely to occur, and of whose occurrence except as a native in this country I have no record, should be “casual” in two suitable habitats a mile apart.

The mill-stream above mentioned broadens further down its course into a muddy flat. Here were several interesting plants. *Glyceria plicata* grew luxuriantly among *G. fluitans*, showing well its difference of character, the large compound spreading panicles and glaucous foliage contrasting with those of its ally. This plant does not appear to have been recorded from the county since A. G. More noted it from "near Glasnevin and Dublin" in the first edition of *Cybele*. Near by were a few fine plants of *Barbarea arcuata* Reichb., which has only one previous Dublin station. Mr. Arthur Bennett writes of it, "the *B. arcuata* I call good *arcuata*." There were also here a curious strong form of *Carex remota*, simulating *C. axillaris* in the large size of its fruit spikes and the compound nature of the lower ones.

R. LLOYD PRAEGER.

Dublin.

Hieracium auratum near Banbridge, Co. Down.

This species, which has been recorded as the most abundant Accipitrine Hawkweed in the Mourne Mountains, does not appear hitherto to have been observed elsewhere in Co. Down. This year I had the pleasure of gathering it amongst rocks in the River Bann by the first weir below Banbridge, where it is fairly plentiful.

J. H. DAVIES.

Lisburn.

Limerick Botany.

The recently issued part (vol. II., No. 6) of the *Journal of the Limerick Field Club* contains a paper by Miss Eleonora Armitage on plants collected chiefly at Thornfields, in that county, in 1901. A few Clare plants are included.

ZOOLOGY.

Trichoniscus roseus near Dublin.

In turning over some rubbish lately in my garden at Rathgar, I came across a specimen of this rare Wood-louse, easily distinguished by its red colour. Dr. Scharff has previously found it in two stations near Dublin—at Leeson-park and at Dundrum—in both instances in rubbish heaps. Mr. Welch has taken a single specimen at Kenmare, and another at Ballyfinder, Co. Down. These are its only Irish records. My specimen is in the Dublin Museum.

R. LLOYD PRAEGER.

Dublin.

Colias edusa in West Kerry.

A number of "Clouded Yellow" Butterflies have been seen on the island during September, and several were taken near Cahirciveen, on the mainland. It is just three years since these butterflies were seen (in August, 1899). They are not so numerous this year as they were then.

M. J. DELAP.

Valentia Island.

Cœcilianella acicula in Co. Dublin.

Mr. Grierson may like to know that I found a number of dead specimens of *Cœcilianella acicula* last April close to the limestone quarry of Feltrim, $7\frac{1}{2}$ miles north of Dublin. They were all on the surface in chinks of rock on the side of an exposed hill. They appeared to have been wind-blown, as dead shells of several other species shared the "pockets" formed by the rock crevices. This quarry is in the Lower Limestone of the Carboniferous series, and the rock is not dolomitised.

A. L. MASSY.

Malahide.

Scalariform Helix nemoralis.

Mr. R. Welch publishes an interesting paper on this subject in the October number of the *Journal of Conchology*. A photographic plate which accompanies the paper shows a graduated series of twenty specimens, varying from a mere high-spined form to one 34 mm. high.

Red-throated Pipit in Ireland.

In the *Zoologist* for August, Mr. F. Coburn writes that the record of this species for Ireland must for the present rest upon the specimen shot by him on Achill Island, May 25th, 1895, as there is some doubt about the Donegal bird; the Donegal pipits are under investigation by him.

Cirl Bunting in Ireland.

On Saturday, August 2nd, within half a mile of Dunfanaghy, Co. Donegal, I watched for some time an adult specimen of the Cirl Bunting (*Emberiza cirlus*). The bird was on some gorse by the side of the road, and allowed me to remain, about ten yards away, sufficiently long to point out to my wife, who was with me at the time, the difference between it and *citrinella*. I may add that the Cirl Bunting is a bird with which I am very well acquainted, and in this case was first attracted by its note. This appears to be the first record for Ireland.—H. E. HOWARD (in *Zoologist* for September).

Late breeding of Corn Bunting.

On 2nd September I found a nest of Corn Bunting (*Emberiza miliaria*) containing four eggs, from which the bird rose. The eggs were warm, and were only slightly incubated.

NEVIN H. FOSTER.

Hillsborough.

A Late Cuckoo.

Mrs. R. W. Longfield writes from Bandon, Co. Cork, to say that on August 18 she heard the Cuckoo's note distinctly near Bandon. The cry of cuc-koo was repeated several times. (*Nature*, August 28).

Ruff in Co. Mayo.

My friend, Major Ormsby, of Rinroe, has given me a fine specimen of the Ruff, shot on the 23rd of August on his snipe bog, at Lisduoge Lough, Co. Mayo, about three miles from Ballina. The Ruff is a very rare visitor to this district, only two others have come under my notice for over forty years past—one a Reeve, shot by Mr. C. Little the first week in September, 1884, on his grouse bog near Tullylin, Co. Sligo, and the other shot by Mr. C. Gallagher, of Bunree, on a grouse bog between Tullylin and Easky, Co. Sligo, on the 3rd of September, 1896.

ROBERT WARREN.

Moy View, Ballina.

Wild Swans in Donegal and Antrim.

I fear that Mr. W. E. Hart and his land steward are mistaken in thinking that the Swans seen passing Portrush and Kilderry were wild ones. For many reasons it is very improbable that wild Swans, at the dates mentioned (25th and 28th July), would be seen south of the Swedish lakes and Baltic coast, which they only leave when driven by frost from their feeding grounds, unless indeed, that they were birds that did not migrate north this season. When seen flying unless near enough to distinguish the markings on head and bill, it is impossible to identify the species, but when seen on the water the position in which head and neck are carried easily distinguish between the wild and tame birds.

Further, in summer many adult tame Swans (probably non-breeding birds) become restless, leave their inland quarters and resort to the coast and estuaries for a few days at a time, and then return inland.

I have repeatedly observed small parties of tame Swans visit the Moy estuary here in June and July, when they have been taken to be wild birds. They generally remain only for a day or two, and then disappear. On the 28th of July I observed a splendid pair of adult birds resting on a sandbank outside one of my fields here, but they disappeared next day, probably returning up the Moy to Mount Falcon or to Lough Gill.

ROBERT WARREN.

Moy View, Ballina.

White-fronted Goose.

In the *Zoologist* for September there appears a long article entitled "On the specific validity of *Anser Gambeli*, and its position as a British bird," by F. Coburn, who has had a large number of White-fronted Geese sent to him from Mayo and Galway during the last few winters. He points out some very great differences that he has noticed in the specimens sent to him, and has come to the conclusion that some are American White-fronted Geese which come south with our common White-fronted Goose from the Arctic regions. The chief differences noticed by Mr. Coburn are that *Anser Gambeli* has greater length, longer wing, bill, and tarsus, and much darker coloration of breast in breeding plumage.

REVIEWS.

THE DEPARTMENT OF AGRICULTURE'S HANDBOOK.

Ireland: Industrial and Agricultural. [Second Edition]. Pp. 16+532. Many illustrations. Browne & Nolan, Ltd. 1902.

We welcome the issue of an enlarged and improved edition of the Department's useful handbook. With its wealth of information, statistical and descriptive, and its 137 illustrations of all kinds, from *Mysis relicta* to Carrickmacross lace and Guinness's brewery, it provides interesting reading for everyone, and is a veritable storehouse of fact regarding the economic condition of our country. Turning to the portion of the book with which we are most concerned, we find Prof. Cole's well-illustrated article on the topography and geology of Ireland reprinted as it appeared in the first edition. In the zoological chapter, Mr. Carpenter has introduced several improvements, chiefly in the addition of illustrations. In the present issue the botanical chapter has been extended from a page and a half to seven pages, but it still lags far behind the kindred sciences. No attempt is made to pick out and describe the remarkable features of the flora of the country, or to collate them with its physical features; this is especially noticeable in the single page that is devoted to the Phanerogamia. The definitions appended to the recently proposed "Irish Types of distribution," are quite erroneous. The absence of illustrations, which form so attractive a feature of the geological and zoological articles, is also noticeable. The volume is excellently printed and handsomely bound.

R. L. P.

NEWS GLEANINGS.

Belfast Natural History and Philosophical Society.

This Society has issued its *Report and Proceedings* for 1901-2. The papers read during the year embrace the subjects of technical instruction, industries, engineering, history, and folklore, but no contribution on natural history, unless Mr. Barcroft's paper on respiration, or Mr. Brown's Delegate's Report on the British Association meeting at Glasgow, be placed under this head. A circular just issued respecting the programme of the coming session announces that papers will be read by Messrs. George Coffey, John Finnegan, J. H. M'Ilwaine, John M'Cormac, and Capt. Calwell—again a remarkable absence of natural history contributors; but we hear that, since the issue of this circular, Prof. Symington and Prof. Gregg Wilson have been asked to contribute papers.

Queen's College, Belfast.

We are glad to announce that Dr. Gregg Wilson, of Edinburgh, has been appointed to the Chair of Natural History in the Belfast College, vacated by the retirement of Prof. R. O. Cunningham. Dr. Wilson's record as an enthusiastic teacher of biology, and an investigator in marine zoology, lead us to look forward with confidence to a greatly increased interest in natural science in the North as a result of his settlement in Belfast. And we welcome him most heartily as a valuable fellow-worker at the problems of the Irish flora and fauna. Mr. Gough has been appointed assistant to Prof. Gregg Wilson. We hope that this step may indicate a speedy division of the work of these "chairs of creation" between two or three naturalists.

The Exploration of Ireland.

Sir Harry Johnston, K.C.B., traveller and administrator, who has been recently exploring the wilds of Ireland, and pursuing researches into its tangled social and political condition, was, on the evening of October 31, the guest of the Vice-President of the Belfast Field Club (W. J. Fennell), at the Museum, College Square North. In the presence of a large assembly, the Special Commissioner and Commander-in-Chief of Uganda showed a large series of slides, some of them never exhibited previously, dealing with the natural history and native races of Central Africa.

Irish Botany Popularised.

During the last two years Mr. Praeger has contributed to every alternate number of "Knowledge" an article on some botanical subject, and in the course of the series the flora of Ireland has been frequently referred to. The subjects treated of have been as follows:—Roots and

Stems, Leaves, Flowers, Fruits, Dispersal and Distribution, The Vegetation of Ireland, Plant Colonists, Notes on Plant Geography, Ferns, The Protean Offspring of Ferns, On an Irish Bog, and The Life and Death of Bogs. To the 1903 volume Mr. Praeger will contribute a series of articles on Familiar British Wild-flowers and their Allies.

New Free Library at Banbridge.

This new Library and Technical Class Rooms, built by local subscriptions with the addition of £1,000 from Mr. A. Carnegie, was opened to the public by a five nights' scientific reception of Banbridge working people and the general public. As the opening arrangements mark a distinct advance on similar functions in Ireland, they may interest readers of this Journal, especially those who may be connected with village libraries in any way. Over 220 people of the working class attended on each of the first four nights by special invitation, the invitation cards admitting on a specified night only. The visitors were conducted in parties of 25 to the microscope room, where each in turn inspected the objects in ten microscopes, to which were attached large cards with boldly printed notes of the objects shown.

This method prevented confusion, and enabled each visitor to see every microscope. The same plan was adopted on the fifth night, when the Urban Council and principal subscribers attended with their families, 1,130 persons in all having availed themselves of the opportunity, so rare unfortunately in an Irish country town, of "seeing through the microscope," the great majority having never done so before. The exhibits were carefully selected by Mr. W. J. D. Walker to not only interest but instruct the class for which the library was mainly built, and to lead up to a lecture also given by him each night in the Technical Hall on the Wonders of the Microscope, and the great part the latter has played in the discovery of the germs of infectious disease, discoveries which have placed medical treatment of such diseases on a surer foundation, much to the benefit of humanity. In addition to the slides of disease germs, including typhoid, diphtheria, &c., there were also shown, both in the microscope and on the screen, a series showing "foul brood" in beehives and the natural history of the bee generally. Foraminifera from ocean depths and shore gatherings (Irish), Polycistinae, Volvox in motion, water-fleas, and various other living organisms in ordinary and impure water. The exhibits which excited most interest, however, were the circulation in a frog's foot and the potato-blight (*Phytophthora infestans*), the fungoid growth which has produced such disastrous results in Ireland. A few members of the Belfast Naturalists' Field Club assisted Mr. Walker by either lending slides or microscopes, or helping with latter during the meetings.







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